

# The Far Eastern Review

ENGINEERING + FINANCE + COMMERCE

*A Monthly Review of Far Eastern Trade, Finance and Engineering, Dedicated to the Industrial Development and Advancement of Trade in Far Eastern Countries.*

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# CHINA

China (Chung Kuo) comprises China Proper (eighteen provinces), Manchuria, Mongolia, Sinkiang and Tibet.

**Area and Population.**—Accurate figures of area and population are impossible to secure. It is generally accepted that the total area is between 4,278,352 and 4,376,000 square miles. The area of China Proper—that is, the provinces of Chihli, Shantung, Shansi, Shensi, Honan, Kiangsu, Kiangsi, Anhwei, Chekiang, Fukien, Hupeh, Hunan, Kansu, Szechuan, Kuangtung, Kuangsi, Kweichow and Yunnan—is set down at 1,532,815 square miles. Its length from north to south is 1,860 miles, and its breadth 1,520 miles.

The estimated population of China Proper ranges from 271,770,000 (331,000,000 is the Mingchengpu census of 1910) to 407,253,029. The generally accepted figure is that of the Mingchengpu census. The total population for the whole of China is estimated at between 342.6 millions and 448,000,000.

**The Foreign Population** in 1918, according to Customs reports, was as follows: American, 5,766; Austrian, 271; Belgian, 360; Brazilian, 16; British, 7,953; Danish, 475; Dutch, 377; French (including 918 proteges), 2,580; German, 2,661; Hungarian, 7; Italian, 535; Japanese, 159,950; Norwegian, 279; Portuguese, 2,417; Russian, 59,719; Spanish, 298; Swedish, 530; Non-treaty Powers, 343; total, 244,527. The figures of German and Austrian population in 1918 were greatly reduced by repatriation in 1919.

**Government.**—The Government of the eighteen provinces is entrusted to civil and military Governors, and under them each province is subdivided into circuits superintended by Taoyins or intendants, and again into districts. All the territorial officials are appointed by the Central Government, and the Provincial Governors, though free to act independently in many matters of local detail and finance, are responsible to the Central Government at Peking in all important questions, and especially in foreign affairs.

**The Army.**—The total strength in all forces after the rebellion in 1913 was estimated at 600,000. As various commanders recruit to suit their own purposes no accurate figures are available, but at the end of 1917 it is probable that 800,000 men were under arms.

**The Navy.**—This arm of the defense is out of date. China possesses two protected cruisers built in 1911 (2,756 tons), four older protected cruisers (4,300-3,000 tons), three torpedo gunboats (850 tons), eleven gunboats (750-550 tons), four destroyers (400 tons), and eight small torpedo boats (120 tons).

**Currency.**—The standard currency in China is silver, its unit being the Tael, which is not a coin but a weight, its value varying considerably. In 1882, in Shanghai, the tael was worth 5s. 2d.; in 1892 the Haikwan Tael (the official Customs Tael) was worth 4s. 4½d.; in 1907, 3s. 3d.; in 1917, 4s. 3½d.; in 1918, 5s. 3½d. Various silver dollars circulate, as well as copper cents, while cash is greatly used among the poorer classes and country people. The cash should weigh one-tenth of a tael and have the value of 1,000 cash to a silver tael, but this standard is never maintained. In 1882 a Shanghai tael (5s. 2d.) was equal to 1,690 cash, and in 1902 when the tael was worth 2s. 7½d. it was equal to 1,240 cash.

**Foreign Trade of China.**—In 1918 the net value of foreign trade of China was the highest on record, the total being Hk. Tls. 1,040,776,113, an increase of Hk. Tls. 28,325,709 over that for 1917. Net imports of Hk. Tls. 554,893,082 compared with Hk. Tls. 549,518,774 in 1917; and exports of Hk. Tls. 485,883,031 compared with Hk. Tls. 462,931,630 in 1917.

**Treaty Ports, Trading Ports, and Ports of Call.**—There are forty-eight treaty ports in China, which are classified by the Chinese Maritime Customs as follows:

**Northern Ports:** Aigun, Sansing, Manchouli, Harbin, Suifenho, Hunchun, Lungchingsun, Antung, Tatungkwow, Dairen, Newchwang, Chinwangtao, Tientsin, Lungkow, Chefoo and Kiaochow.

**Yangtze Ports:** Chungking, Ichang, Shasi, Changsha, Yochow, Hankow, Kiukiang, Wuhu, Nanking and Chinkiang.

**Central Ports:** Shanghai, Soochow, Hangchow, Ningpo and Wenchow.

**Southern Ports:** Santuao, Foochow, Amoy, Swatow, Canton, Kowloon, Kongmoon, Samshui, Lappa, Wuchow, Nanning, Kiungchow and Pakhoi.

**Frontier Ports:** Lungchow, Mengtze, Szemao and Tengyueh.

**Ports Opened to Trade are:** In *Manchuria*: Mukden, Fakumen, Fenghwangcheng, Sinminfu, Teihling, Tungkiangtze, Yingkow (Newchwang), Liaoyang, Changchun, Kirin, Ninguta, Chuizuchien, Toutaokow, Tsitsihar, Hailar. In *Sinkiang*: Kashgar. In *Shantung*: Chow'sun, Tsinanfu, Weihaiwei, Weihsien. In *Kiangsu*: Woosung. In *Tibet*: Gartok and Gyantze.

**Ports of Call:** For Passengers and Cargo: In *Kuangtung*—Kumchuk, Shuihsing, Pakto, Takhing, Lating, Dosing. In *Kiangsi*—Hankow. In *Anhwei*—Tatung, Anking. In *Hupeh*—Wusueh and Luk'kow.

For Passengers: In *Kiangsu*—Kiangyin, Icheng. In *Hupeh*—Hwang-shihkang, Hwangchow. In *Kuangtung*—Fengtsun, Kaukong, Yutshing, Lukpa, Howlik, Loto, Maning, Yungyan, Kulo and Jungki.

**Railways.**—Government railways in operation ... 3,793 miles  
Concessioned railways in operation ... 1,847 „  
Private railways in operation ... 150 „

Total railways in operation ... 5,790 miles

Government railways under construction are about 330 miles.

**Weights and Measures.**—1 Tael (*Liang*)=583.3 grains (1½-oz. avoirdupois)=37.783 grams.

16 Taels=1 CATTY (*Chin*)=1½-lb. avoirdupois=604.53 grams.

100 Catties=1 PICUL (*Tan*)=133½-lb. avoirdupois=60.453 kilograms=147.67 Russian pounds.

**Length:** 1 Chih=14.1 inches or 0.358 meters.

1 Li=about one-third of a mile (or theoretically 2,115 feet, or two-fifths of a mile).

**Area:** 1 Mow (Shanghai)=one-sixth of an English acre.

**Capacity:** 1 Tow (for tribute)=629 cubic inches (10.31 liters).

**Rivers.**—The Yangtze-kiang is 3,200 miles in length. It rises in Tibet and drains some three-quarters of a million square miles of country. It is navigable for large steamers to Hankow (600 miles from the sea), for slightly smaller vessels to Ichang (1,000 miles), for small steamers and steam launches for 300 miles farther, and for junks for 200 miles farther; or a total distance of half its length is available for the transport of merchandise. The river was opened to foreign trade by the Treaty of Tientsin (1858).

The Yellow River, or Huang-ho, rises about 100 miles from the source of the Yangtze. It is from 2,500 to 2,700 miles long, but is navigable only by junks, the vast quantities of silt carried by it and deposited in its channel rendering steam navigation impossible.

The Sikiang, or West River, rises in Yunnan and reaches the sea by several months near Canton. Its length is about 1,000 miles. Steamers go as far as Wuchow, some 220 miles from Canton and launches some 200 miles farther. Junks navigate it to near its source.

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# FAR EASTERN REVIEW

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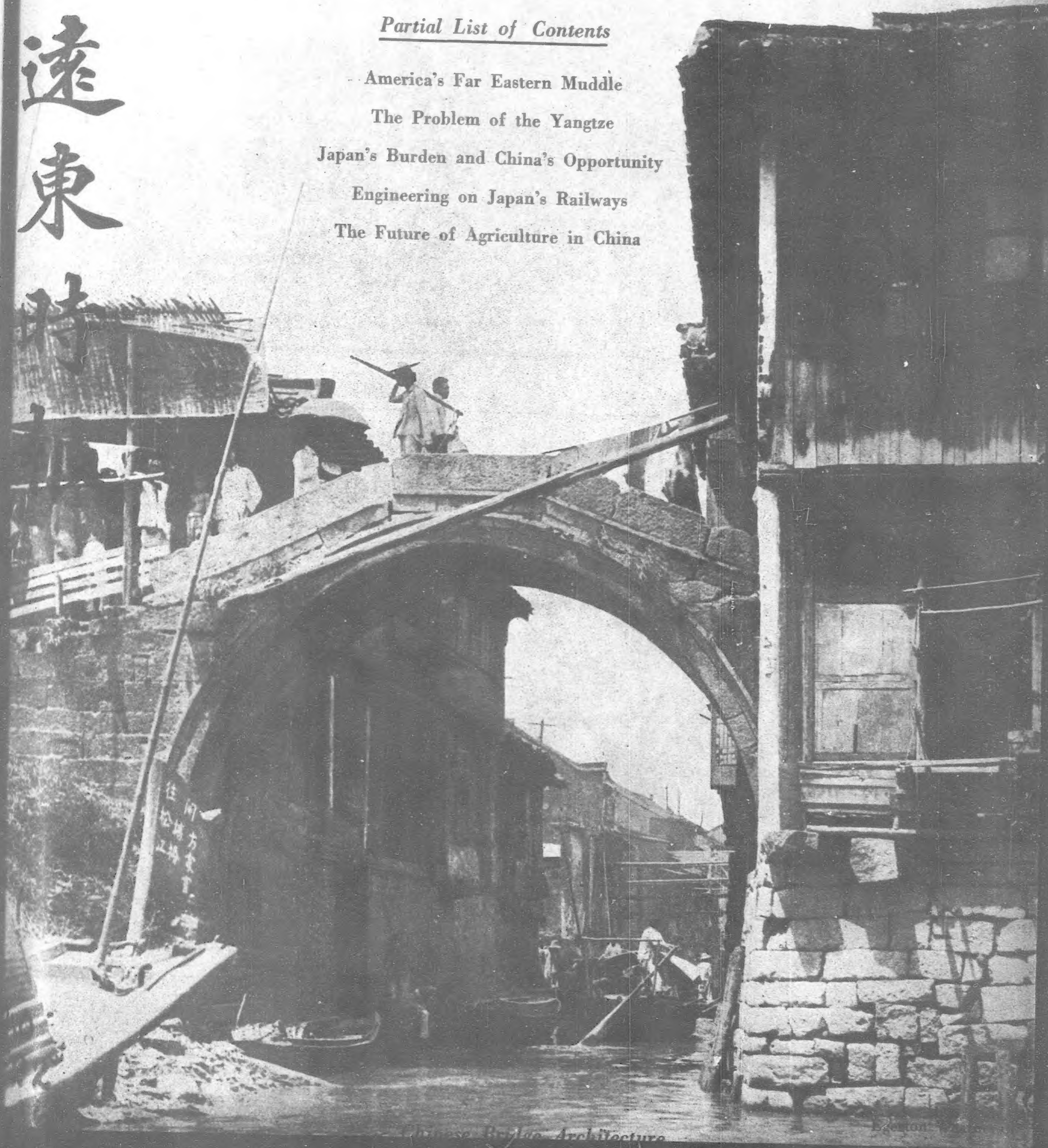
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Japan's Burden and China's Opportunity

Engineering on Japan's Railways

The Future of Agriculture in China

遠東



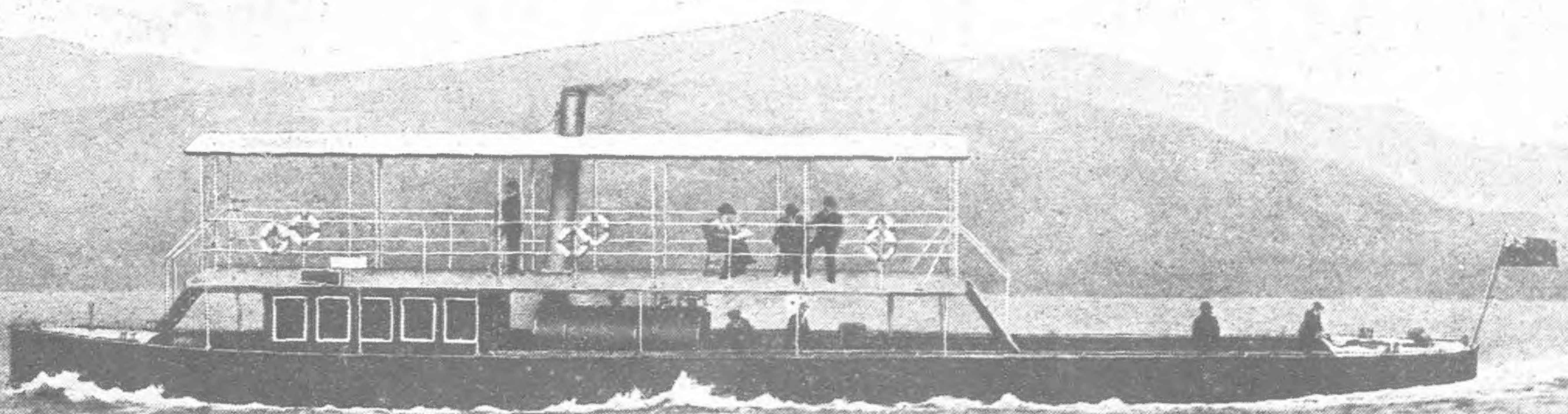
Chinese Bridge Architecture

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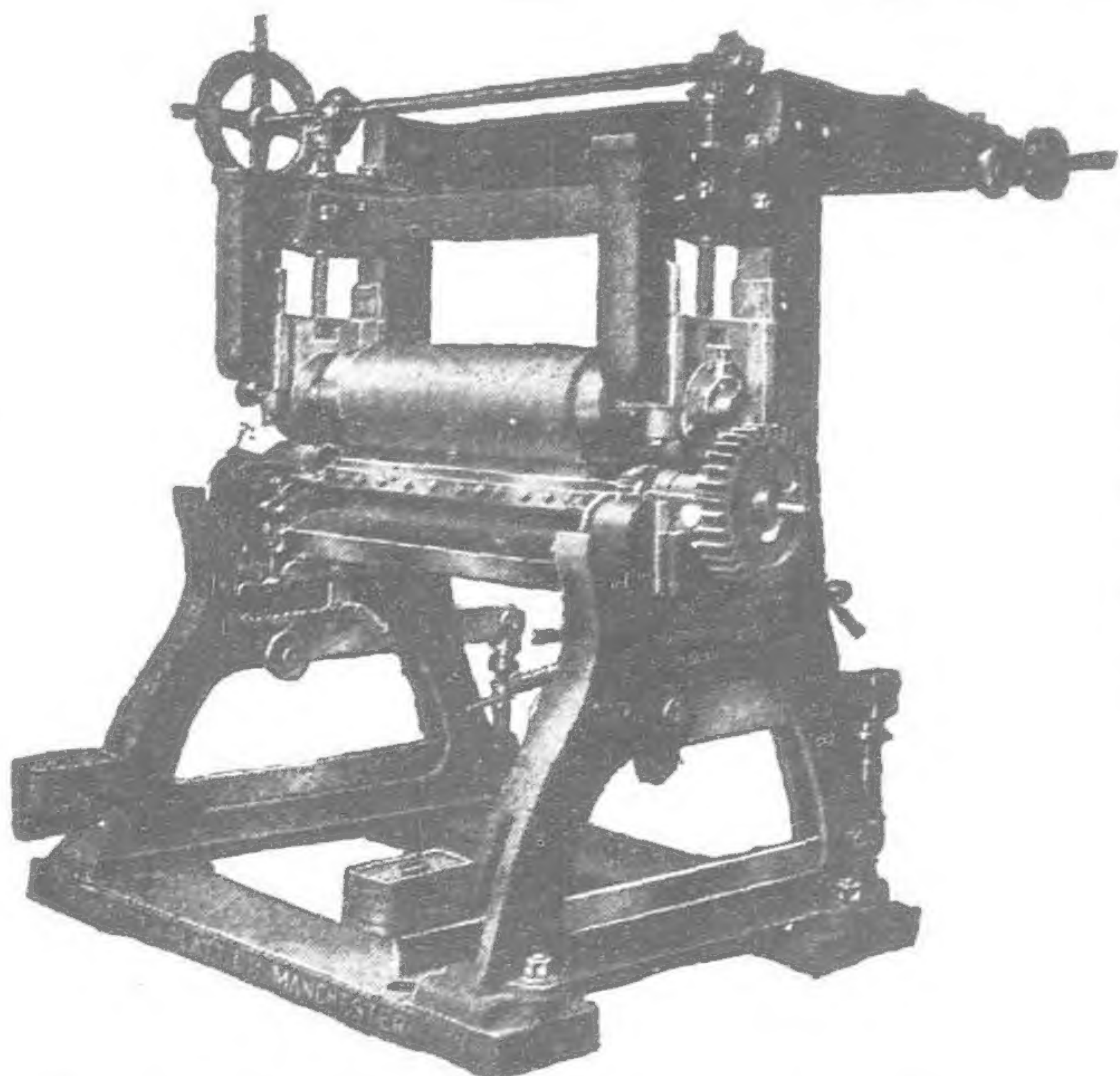
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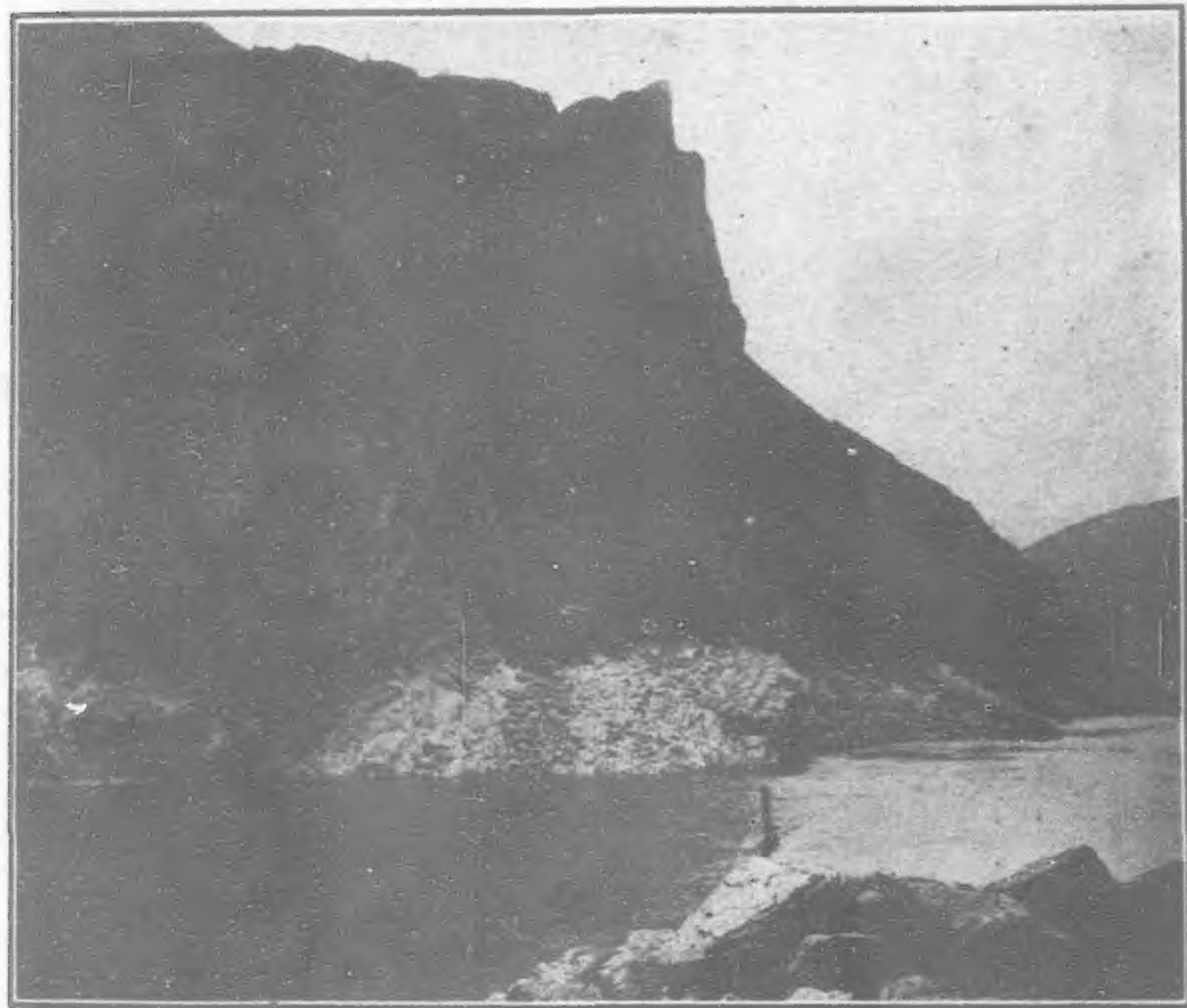
SHANGHAI, FEBRUARY, 1920

No. 2

## Gigantic Works Needed on the Yangtze

Hankow "Barred" in Winter for Ships over 8-ft. draft: Chinkiang Left High and Dry, and Shanghai's Future as a Leading Ocean Port Menaced

IT was by no means unforeseen that one of the resolutions passed at the Conference of British Chambers of Commerce in China, held in Shanghai during the early part of November, should deal with the question of meeting the gigantic problems presented by the Yangtze to China in general and to steam navigation in particular—problems on the correct solution of which depends the economic future of one of the largest and most important parts of China. The resolution was in fact a belated recognition of the demand for attention to this subject by the best conservancy engineers—a demand that has been noticed by observers for some years past.



In the Yangtze Gorges near the Village of Hsintan

The problems which the river presents are as big as the Yangtze itself, and apart from the benefits which a proper regulation of the river would ensure, the whole question has this great feature: if mere man is to succeed in taming this giant, he will have to marshal his best forces and resources before attempting to place even the slightest curb upon it.

Shortly before the Conference took place an inquiry was held into the circumstances attending the loss of the str. *Tamsui* in the Yangtze below Hankow, and the evidence then adduced pointed to the need of further and greater study of the currents of the river which are playing so important a part in this huge waterway. Rapid silting, a bed which makes and unmakes itself with a celerity which takes all the time of foreign inspectors to maintain a watch over it, the seasonal high water and shallows, the gorges and their rapids, all present problems which have to be met and in the division of the river into Upper, Middle, and Lower

Yangtze\* may be found a rough classification of the two general types of difficulties which engineers in the future have to face in dealing with this river.

We heartily agree with the purport of the resolution; we think that the subject is one which could with advantage be taken up by other corporate bodies in China for the purpose of strengthening the hands of those who are taking the larger view of the whole question. The time has undoubtedly come when the immediate needs of improvement and the resources available to do this should be thoroughly looked into.

The immediate question which, it must be confessed, overshadows the larger issues by reason of the prospects of so quick a return on the money to be spent on it, is navigation. The rapids in the great gorges are as dangerous as they ever were, and with the recognition that something has to be done to render possible the easier tapping of the wonder province of China—Szechuan—comes the appreciation of the fact that the removal of the more dangerous rocks may be possible in order to mitigate the present evils to be encountered on a voyage from Ichang to Chungking.

The alternative consists of works on an enormous scale connected with canalization, water-power schemes of the greatest magnitude necessitating enormous capital outlay and huge risks. Possibly the two might be combined, rock removal coming first and relieving some of the difficulties of the whole situation, while embarkation on the larger scheme is awaited. In any event there are prospects that this section of the river would have to wait for some considerable time.

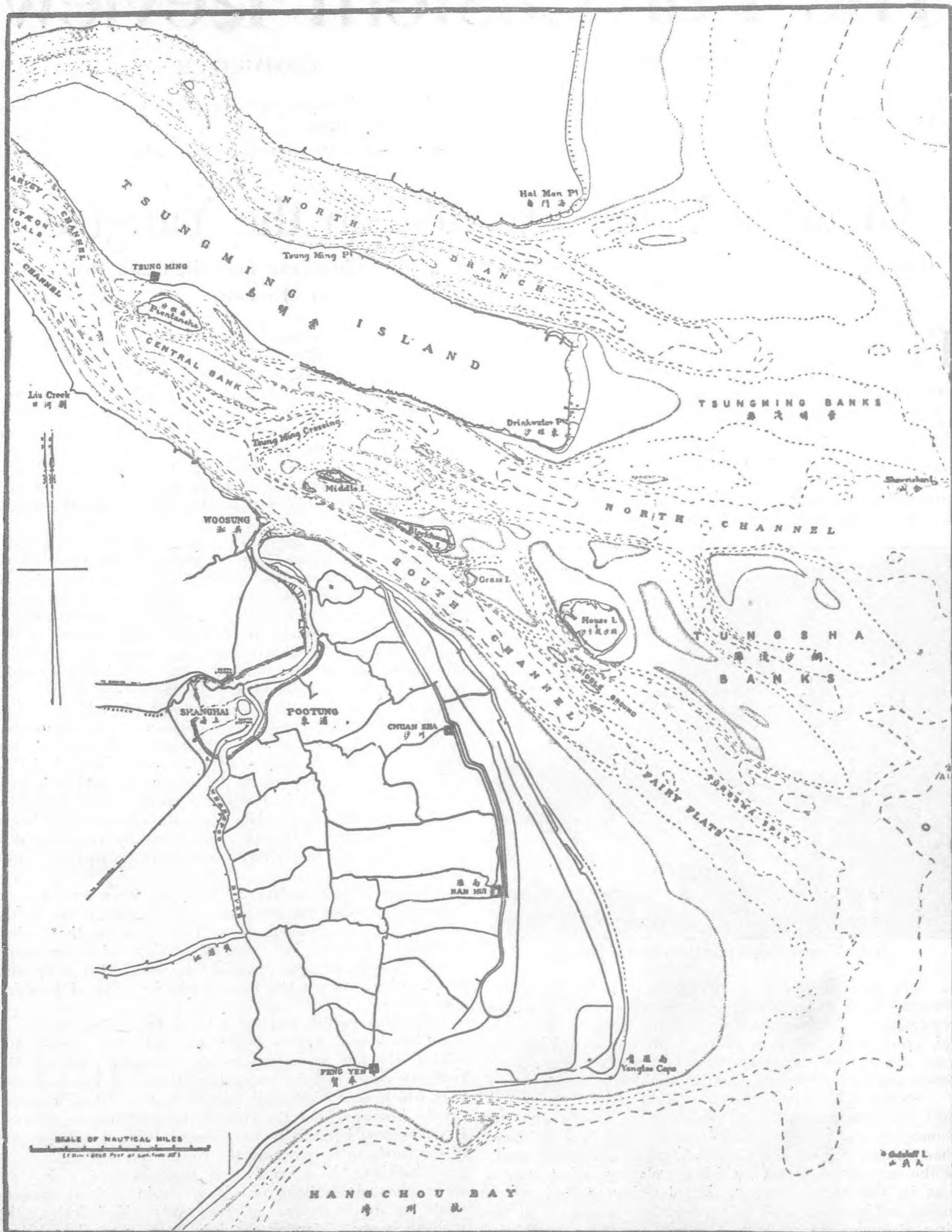
Below Ichang, as far as Hankow, improvements are, however, possible as regards ensuring the greater safety of river steamers, though here it is possible that when immediate benefits are weighed against what eventually would have to be done, it might be found that temporary amelioration was not the most economical way of handling the matter.

Hankow, which has before it a tremendous future as a railway centre, suffers from the fact that during the winter—the low water season—the shipping visiting the port can only enter by channels restricted by crossings and bars which only yield eight feet of water. These passages can be improved, but the port of Hankow and the districts it serves would naturally be expected to raise a large part of the funds to be spent on the work.

Chinkiang is a victim to the changing of the deep water channel of the river. It is, again, a local problem vital to the existence of the port. Technically, the problem is one of forcing the deep water channel back into its old course, close to the present Bund of Chinkiang—or

\* Upper—Chungking to Ichang; Middle—Ichang to Hankow; Lower—Hankow to Woosung.





Part of the Estuary of the Yangtze River, showing the approaches to Shanghai



of dredging continually along the present frontage in order to keep a sufficient depth of water at the hulks and pontoons.

The other river ports are well situated in regard to access of steamers, and have, so far, no urgent need of improvement of the channel.

Shanghai, as the principal seaport of the Yangtze, has its own enormous bugbear in the shape of the Fairy Flats in the mouth of the river, and at the present moment the question is under consideration as to the best means of improving the passage of the Flats or of circumventing the difficulties which they present. The Shanghai Conservancy Board has the matter of inquiry in hand, prompted by its Engineer-in-Chief and other experts, and extensive reports have already been issued by the Board on the subject. There is every reason why Shanghai should take up this battle with the silt if it can be done within the limits of its resources, and there can be little doubt that the vested interests of the port can be depended upon to make considerable efforts in this connection.

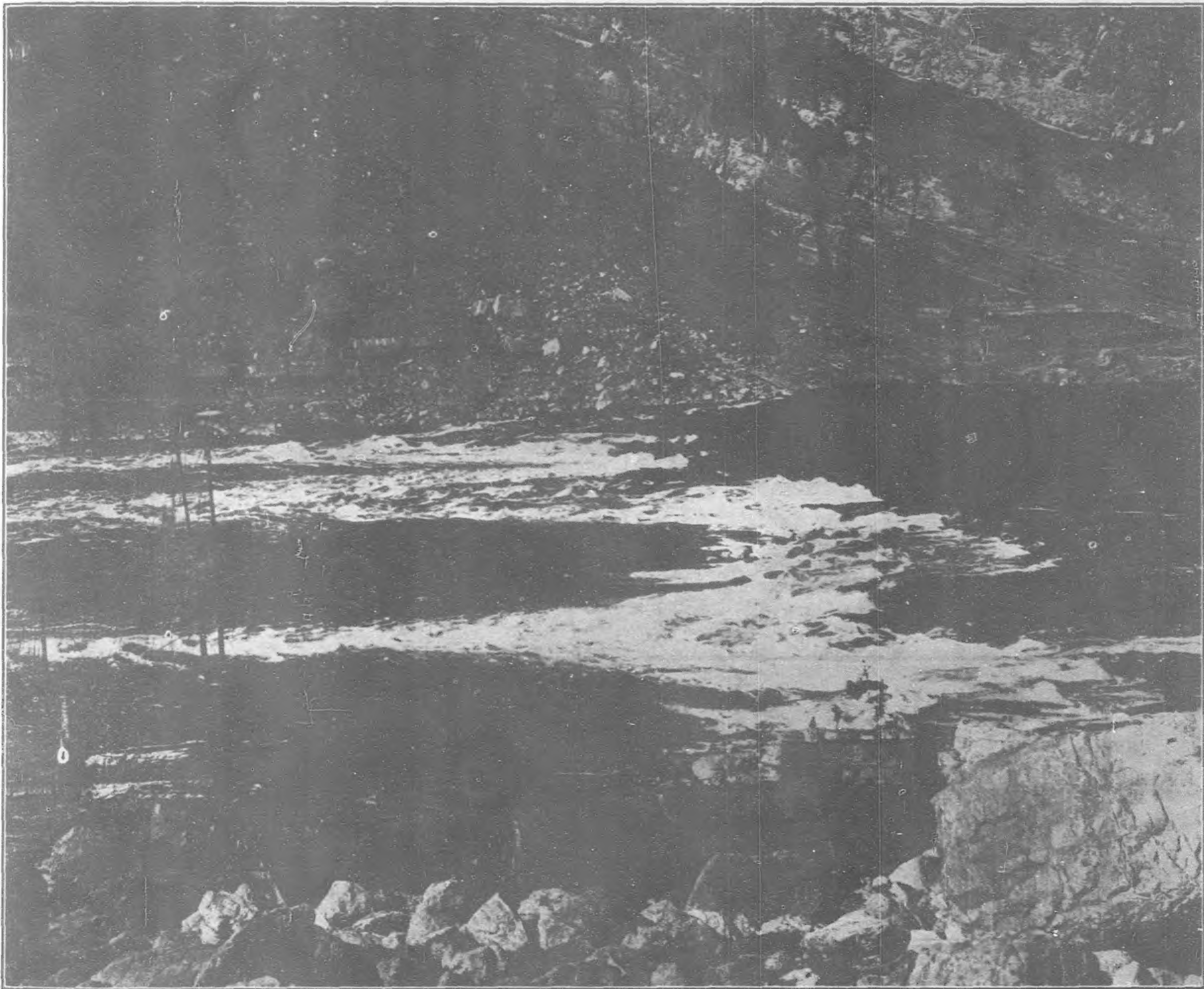
Generally speaking, however, and quite apart from the needs of navigation, the river first needs a complete recharting, on the basis of a thorough modern survey, as well as the main tributaries. Already the marine staff of the Chinese Maritime Customs have been surveying the Estuary,

and, having recently made chart making a business, are equipped for such work and, probably, are prepared to continue if funds are forthcoming.

But there is a danger against which all concerned should be warned. That danger is to plunge into a make-believe organization and an amateur scheme—for which China is such a fertile ground and which are so dear to certain classes of Chinese.

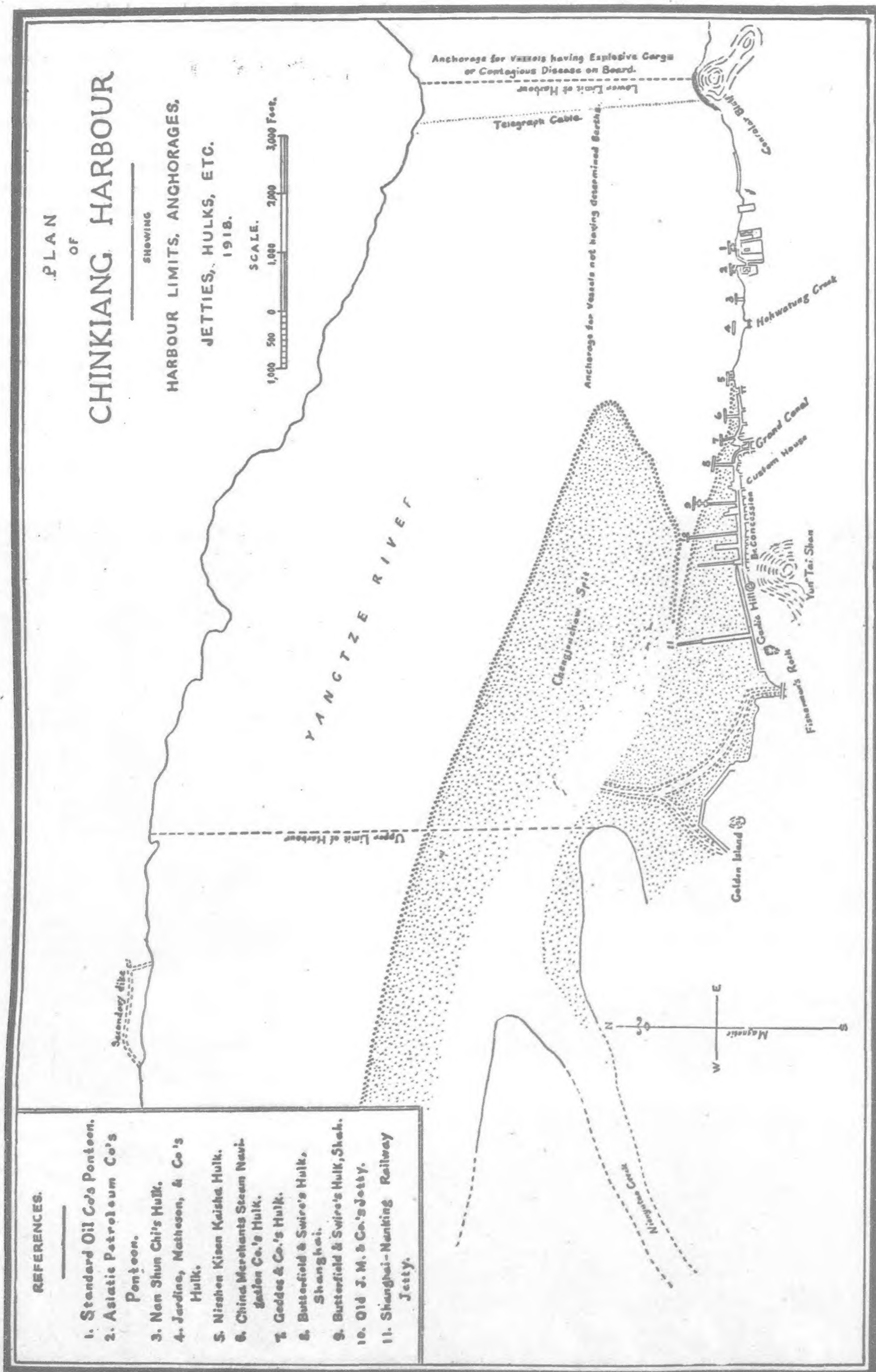
This is one of those questions in which all who are interested and keen to promote a solution, should do their utmost to see that the matter is properly gone into, without undue haste, and that the best expert advice is procured, followed when obtained, and finally that the machinery created to handle the work is both worthy and capable of the immense task before it.

In due course, after completion of the surveys—when all concerned will have had time to consider and estimate the extent of the needs to be met, the interests involved and the resources that can be counted upon—a preliminary representative commission of delegates and specialists—to report on general constitution and organization, practical possibilities of improvement and ways and means, would appear to us to be the next step, prior to the institution of any general River Conservancy Authority.



The Hsintan Rapids on the Upper Yangtze





Plan showing the formation of the Chengjenchow Spit which is menacing the port of Chinkiang. A casual glance at this plan will show how the foreshore of Chinkiang is being cut off from the deep water of the river.



### The Doomed Port of Chinkiang

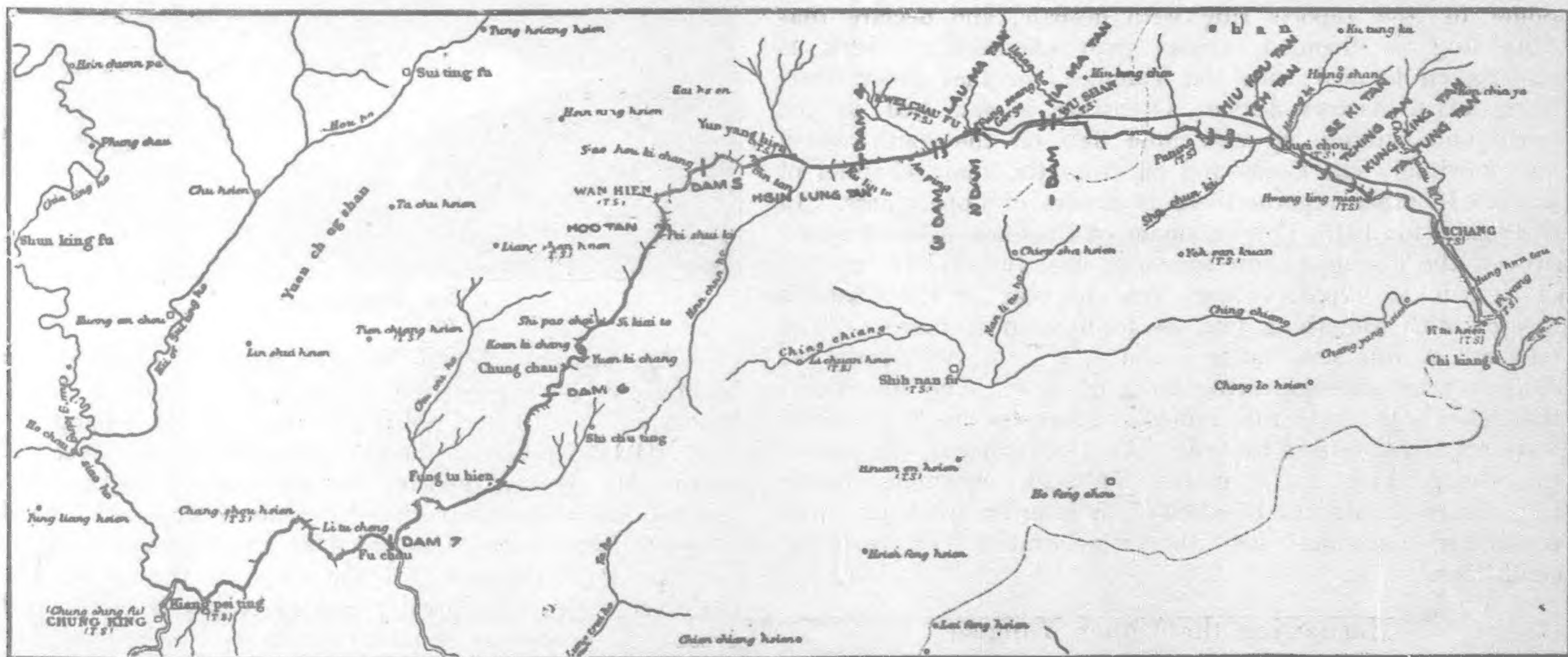
For nearly twenty years Chinese and foreign merchants, shipping companies, Customs authorities and others have been much distressed by the marked decline in the trade of Chinkiang. The Customs reports by the various Commissioners stationed at Chinkiang since 1906 year by year rehearse the difficulties under which both Chinese transport by small boats and large river steamers, whether Chinese or foreign, labor in their efforts to keep Chinese local products moving through the port to the larger shipping centres and to distribute foreign goods from Chinkiang to the various rural districts which were formerly dependent upon it as a distributing centre. How to save Chinkiang both as a market place and as a convenient port for river vessels has elicited much anxious thought from the various Customs Commissioners and from the experts whom they have consulted. Every official and business man who has been stationed at Chinkiang during the last two decades has seemed to regard this as one of Chinkiang's very vital problems. If this attitude were due entirely to self-interest or acquired local patriotism, if it could be shown that the products which formerly passed in and out of Chinkiang are now passing through other shipping centres with as much expedition and at less expense, it would be good trade policy to put the local clamor down to either petty local interest or sentimentalism, and to permit the port of Chinkiang to go the normal way of the unfit.

There is, however, very good reason to believe that it is possible to prove that with the introduction of scientific conservation in the rich rural districts both north and south of the Yangtze River which formerly were entirely dependent upon Chinkiang, the port will again become not only a convenience but an economic necessity: and that any funds expended in the immediate future in making arrangements for the continuation of shipping activities and improving the many tributary waterways which establish its connection with northern Kiangsu, southern Shantung and Anhwei, not to mention those in the direction of Soochow and Hangchow, will be an eventual economy.

Chinkiang is one city in China which the development of railways has not materially helped except in a superficial way, but its greatest enemy has been silt. Much of the native produce which formerly came to Chinkiang for

shipment, in spite of floods, droughts and the neglect of waterways by Chinese officialdom, now finds a more convenient and expeditious outlet by way of the various railways which have been built in the last two decades—the Shanghai-Nanking Railway, the Tientsin-Pukow Railway, the Tsinan-Tsingtao Railway and that section of the Lung-Hai Railway which connects Hsuehowfu with Chengchow on the Peking-Hankow line. Chinkiang's trade has been diverted through more or less direct shipments to Shanghai, Pukow and Tsingtao, and even to Tientsin and Hankow. If the Lung-Hai Railway were completed from Hsuehowfu to the port of Haichow, Chinkiang's loss would be even greater. Pengpu on the Hwai River and on the Tientsin-Pukow Railway has grown from an insignificant village to an important trading centre largely at Chinkiang's expense. There is no denying that thanks to improved railway communications the general volume of trade in the districts which were formerly solely dependent upon Chinkiang is much greater, but it can be asserted with equal assurance that many of the productive areas now lost to Chinkiang will find it much more economical to trade with the coast ports through this market when the Grand Canal and the many minor canals and rivers which it intersects have been properly dredged and developed as waterways.

If one studies the reports of the Chinese Maritime Customs for the last fifteen years, it will be found that the condition of the Grand Canal and the chronic propensity of the Huai and other rivers to create devastating floods and ruin both agriculture and transportation, were at one time the major tribulations of those who were interested in Chinkiang's trade. But in recent years the one great Chinkiang bogie has been the growing and moving island of Chengjenchow. As early as 1907 it is mentioned in Customs reports as an island to the west of the Foreign Concession, separated from the south bank of the Yangtze by a narrow channel. At that time the northwestern end of the island was being eroded, and Commissioner F. E. Taylor mentions in his report that a spit had been thrown out to the east which had extended 5,000 feet in two years. Successive reports during the last twelve years are filled with chronicles of the growth of this spit until it is now said to have blocked the southern entrance to the Grand Canal, since when it is prophesied that "it will not be very long before the entire river frontage down to Consular Bluff (Peikoshan) will be utterly unapproachable."



Plan of the Upper Yangtze showing position of Rapids and Sites for dams proposed by Mr. Sidney J. Powell



Between 1914 and 1915 there was a loss in Chinkiang's trade of more than Tls. 2,000,000 and at the end of the latter year the trade total was only 54 per cent. of that recorded in 1906. In the meantime both the output of native goods and the consumption of foreign goods in the districts dependent upon Chinkiang had probably been



A view of the Sanchi Gorge on the boundary line between Hupeh and Szechuan Provinces

multiplied many times, but the siltage in the Grand Canal both north and south of the Yangtze River, the poor condition of the minor waterways which have been constantly dry or over-flooded as droughts and inundations alternated, and the growing difficulty of loading and unloading steamers between the Chinkiang bund and the Chengjenchow bogie have so discouraged rural producers and consumers that they have given their patronage, whenever possible, to the more reliable though more expensive railways.

A running chronicle of the tribulations of the Chinkiang merchants may be found in the annual Customs reports from 1906 down to the present time. The various Commissioners who have shouldered Chinkiang's troubles have agreed heartily upon the sources of these troubles, but as they have consulted various authorities, they have been of various opinions as to the possibility of alleviating them. Some of the reports ring with despair, and declare that Chinkiang is doomed, unless great engineering work is undertaken to deal with the Yangtze, for that great river, being left to its own devices, is cutting a new bed to the north and banking up new mud flats on the south which will inevitably cut Chinkiang off from the main channel of trade. In other reports there is a note of hopefulness. In the report for 1918, Commissioner of Customs F. J. Mayers, says of the Chengjenchow sandspit, the fungus-like growth of which is reported from year to year in the Customs records with something like the fascination of horror; "The removal of this now large island . . . would not be difficult from an engineering point of view. The statements that have been made that remedial measures are 'impossible' were apparently based on exaggerated estimates of the cost of the work, which in a matter of such enormous public importance should not be allowed to interfere with any well considered scheme for the amelioration of existing conditions."

#### Harnessing the Upper Yangtze

The problem of the Upper Yangtze is a special one which, if adequately dealt with, calls for high class engineer-

ing. The river is one steep descent through tremendous gorges and is barred in parts by serious obstructions which cause at periods unsurmountable rapids. Mr. Sidney J. Powell, A.M.I.N.S.T.C.E., F.R.G.S., of Shanghai, some time ago made an investigation of this section and notes from a report which he has made should be of the greatest interest to all concerned in the possibility of rendering this part of the river feasible for unlimited steam navigation.

Mr. Powell points out that the section which would have to be dealt with stretches over 400 miles between Ichang and Chungking. Between these two ports there are 35 rapids, those between Ichang and Wushan being caused by the detritus brought down by mountain torrents and are not so dangerous when the water is at high level, the rapids disappearing with the rise of the river. Mr. Powell says that the greatest source of danger at all the rapids is rapidity of flow combined with narrowness. This rapidity which sometimes is as high as 10 miles per hour is not dangerous where there is plenty of width, but it becomes a great danger when a vessel ascending or descending has a channel only 50 feet wide in which to navigate, especially when that channel is tortuous.

It is estimated that 11 per cent. of the junks plying on the Upper Yangtze are damaged or become a total loss, a condition which would unquestionably be made better by intelligent work calculated to widen, deepen, and straighten the channels at the rapids. The rise of the river is extensive, and at Chungking has been as high as 117 feet—40 feet of this rise occurring within one day and as quickly subsiding. The rise generally begins in February and is at its highest during July and August, a sudden rise, sometimes as much as 40 feet, being caused by freshets coming down the Yangtze river and the Kialing river simultaneously meeting at Chungking.



The Wushan Gorge

The descent of the Yangtze between Chungking and Ichang can be appreciated when it is mentioned that the latter port is 610 feet above sea level, while Ichang is 134 feet, the difference in height thus being 476 feet. This means, Mr. Powell reports, that the upper Yangtze between the two cities is endeavoring to create a slope of one foot in 4,450 feet, or twice as steep as an ordinary river.

Mr. Powell found that the slope of the actual bed of the river varies very greatly and in reality is constituted of a series of pockets in some of which there is a depth of 200 feet. The sides of the pockets are the ridges where the rapids occur and the narrows or gorges where the river is



narrowed down by the precipices through which it has eaten its way. It must be remembered that the gorge at Ichang is the only water outlet from the Great Szechuan plain, and that plain in Mr. Powell's opinion, was formerly a sea of water with a discharge of flood water over the comparatively low hills south of Yunyanfu a city in the northwest corner of Hupeh, on the river Han.

#### Hydro-Electrical Possibilities

The tremendous possibilities for hydro-electrical developments on this river will be appreciated when it is mentioned, as Mr. Powell points out, that the discharges of the river at Chungking are 75,000 cubic feet per second at average low water; 774,000 cubic feet per second at average flood, and 1,065,000 cubic feet per second at highest flood. The horse power developed by the river at average low water is 430,000, or 319,780 kilowatts. At average flood it is 4,400,000 horse power or 3,282,400 kilowatts. Mr. Powell emphasizes that this latter power is 30 per cent. more than the power possibilities of the Niagara Falls—this being estimated at  $3\frac{1}{2}$  millions horse power—where the head obtainable is 145 feet.

How the river may be conserved and how this valuable potential energy may be used is set out by Mr. Powell in a program based on improvements of the bed and channel of

the river. There are, he says, nine bad rapids between Ichang and Wushan (90 miles), namely, (1) Tatungtan, (2) Kunglingtan, (3) Tchingtang, (4) Lienhoatan and Sekitan forming one long rapid, (5) Yetan, (6) Niukoutan, (7) Tsingchupiao, (8) Fulitsi, (9) Wanliautan, which could be improved by the removal of rock at low water and by dredging the detritus collected in the bed of the river to an average width at low water of 900 feet and a depth of 15 feet. Two-thirds of such necessary work could, in the opinion of Mr. Powell, be done in the low water season, while, by employing a Lobnitz rock-breaker or similar machine, the remainder of the rock could be easily removed. Bucket dredgers capable of lifting 500 tons an hour could be employed, to lift the broken rock and detritus. The deep holes in the channel could be filled with the material thus excavated.

Mr. Powell proposes to eliminate the rapids between Wushan and Chungking by the erection across the river of a series of dams 50 feet in height above low water level, the dams to be pierced with regulator openings operated on the Stoney principle by electric motors, and provided with three locks each, the lift of each lock being 18 ft. 8 in. This would mean 21 locks between Wushan and Chungking, each lock being 250 feet long by 50 feet wide, to be operated by electric motors. The electric motors for operating the re-



The Glorious Dragon Rapid (or Hsinlingtan) showing Staging Leading to Rock (on Extreme Right of Picture) in the Middle of the Stream Preparatory to Blasting



gulator openings would be situated on a bridge to be erected on the crest of each dam.

Mr. Powell estimates that seven dams each 3,000 feet long will be necessary at Wushan, Kweichaufu, Nganping, below Yunyanghsien, above Siaokiang, above Chungchow, and at Fuchau.

At each dam hydro-electrical installations could be erected, but Mr. Powell thinks that at the outset one large installation at the Wushan dam would be sufficient, though power would be similarly supplied at each dam for the operation of the regulator openings and lock gates.

In addition to the improvement of the river Mr. Powell urges the construction of a 200-mile railway from Wushan to Yunyangfu, in Hupeh Province, to assist in the development of Szechuan by connecting the Upper Yangtze with the Han River. He also advocates the improvement of the Han River from Yunyangfu to Hankow. The Han is navigable for vessels of five feet draft from Hankow up to Lao-hokow, which is 80 miles from Yunyangfu, and between these two cities is navigable for small craft and can be improved.

#### The Question of Cost

Mr. Powell estimates that the improvement of the rapids will involve the breaking of 2,000,000 cubic yards of rock

and the dredging of 6,000,000 cubic yards of detritus and rock, the cost of which he approximates at £450,000. This includes the cost of two rock-breakers, two bucket-dredgers, upkeep, repairs and all machinery and labor in connection with the work. As the two rockbreakers would be capable of dealing with 900 cubic yards of rock per week and the bucket-dredgers with 500 tons per hour it is estimated that the work could be accomplished in 4 years.

The cost of dams and locks, consisting of masonry dams each 3,000 ft. long and 60 ft. high with 150 regulator openings, bridge along crest of dam and 3 locks, is estimated at £1,030,000, and 7 dams each with 3 locks as above £7,210,000.

The cost of a hydro-electric installation below Dam No. 1 near Wushan, including cost of buildings, penstocks, conduits, turbines, generators, tail race, etc., to develop 25,000 kilowatts, is estimated at £600,000.

A railway (gauge 4 ft. 8½ in.) from Wushan to Yunyangfu, including terminal stations, wharves, bridges, signals and telegraph, but not including rolling stock, is estimated to cost £1,440,000.

Improvement of the Han River to a depth of 10 ft. and a width of 900 ft. is estimated at £825,000. These improvements Mr. Powell estimates, would involve a total cost of £10,525,000.

## America's Far Eastern Muddle

By George Bronson Rea

NEW YORK, November 29, 1919:—"The great defect of the present administration is the incapacity of the Democratic party as it is represented in Washington, both in the legislative and executive departments, either to originate wise policies or to follow them when proposed by others, or to administer them effectively if they are established," declared Elihu Root during the last presidential campaign.

"A policy of vacillation, of feeble tries at conciliation where force and strength were needed, of threatened force where intelligent diplomacy might have served, of watchful waiting, of punitive expeditions which failed to punish, and of near ultimatums dispatched with no thought of the alternative to be employed in the event of defiance has finally come to fruition in Mexico. To-day the United States faces the openly expressed contempt of an entire people and that people its nearest neighbor to the south, a full ninety per cent. of which is illiterate, impoverished, wartorn, and practically without resources."

In these words the "New York Herald" voices the unmistakable opinion of the vast majority of patriotic and thinking Americans towards an utterly incompetent administration whose inability to originate or follow wise policies is slowly but surely leading the nation to the brink of another war, a war of murder, bushwhacking and atrocities, the only warfare that can be waged by a semi-civilized, disorganized people, a repetition of the horrors of the Cuban insurrection.

The same methods, the same tactics, the same ignoring of vital principles, is imperceptibly widening the breach between the United States and Japan. The Far Eastern policy of the Administration is a disgrace to the nation. Our interests in that part of the world have been handed over to theorists, idealists, propagandists, uplifters and impractical literatii whose crass ignorance of practical international politics is luring the country deeper and deeper into the web of Oriental intrigue from which there is no escape short of humiliation.

For the past four years it would seem that the Far Eastern policy of the nation has been directed and controlled from Peking, as the full weight of our diplomacy has been concentrated upon discrediting Japan, while ignoring the similar acts and positions of other Powers. Three times during the past four years when confronted with grave Far Eastern issues, the Administration has side-stepped and ducked, wobbled and wriggled, and notified the nation that these matters would all be straightened out at the Peace Conference or a separate international convention to be called for that purpose. And, when the time came to make good on its promises, and arrive at a reasonable solution of the problems by a full and frank discussion with all the interested Powers, we find that the entire weight of our diplomacy was centered on depriving Japan of the fruits of her participation in the war, and hamstringing her activities in Manchuria.

What could not be accomplished by diplomacy is now being attempted through finance. The full weight of the State Department is now being employed through the new Consortium, to compel Japan to recede from her position in Manchuria and Inner Mongolia, and the press of the United States, who know only one side of the question, are loud in denunciations of Japan for her refusal to pool her concessions in those regions.

The State Department bases its opposition to Japan's position on the provisions of Clause X of the new consortium agreement signed in May last, to the effect that "only those industrial undertakings are to be pooled on which substantial progress has not been made."

Substantial progress will eliminate the Hukwang lines, the Belgian, Lung-Hai, the Shanghai-Hangchow-Ningpo, uncompleted sections, the Pukow-Sinyang, and, if actual surveys can be included in the meaning of "substantial progress" it will exclude the Shasi-Singyifu and the Nanking-Changsha railways. The Pukow Harbor Works, with its subsidiaries, the Yangtze River Bridge and the Peking Public Utilities, and the Pritchard Morgan concession grant-



ing a monopoly of mining rights to the vast province of Szechuan will be immune from pooling. Mongolia is a closed preserve against Chinese Railway development, a policy that Russia will go to war to maintain, as soon as she is in a position to do so. Tibet is barred against railway and other development. All these concessions were signed previous to the war. The Japanese concessions came as a result of changed conditions during the war, consequently there has been no time to make substantial progress in their development. The object of the consortium plan, on its face, is to deprive Japan of full enjoyment of her concessions, while permitting others to proceed without becoming subject to the new arrangement.

The independent French banking group headed by the Bank Industrielle de Chine has refused to pool its valuable concessions, valued before the war at 750,000,000 francs. The entire value of the Japanese concessions will not exceed \$100,000,000. Yet in face of these facts, the State Department seems intent upon pursuing its policy of irritating and discriminating against Japan in order to cover up its inability to solve these problems through a straightforward diplomatic arrangement between all the Powers.

There is nothing new to the situation. It is only a repetition of our manhandling of the Mexican problem which can only lead to an impasse in the relations between the United States and Japan.

While we are meddling in the affairs of the Orient, other meddlers are encouraging the Mexican Government to defy us on this side of the Pacific. Carranza's defense of the imprisonment of our Consular Agent at Puebla, in effect, is the same as that of the United States in the land law incident with Japan. The Federal Government of the United States could not control the acts of the sovereign State of California, and Carranza tells us bluntly that he cannot interfere under the constitution of Mexico, with the sovereign rights of the State of Puebla.

The weight of our diplomacy is being employed to check Japan in China. On all sides we hear of anti-Japanese boycotts, outbreaks and outrages upon the persons of Japanese subjects domiciled in China. There is evidence that these incidents are the outcome of American meddling in the relations between the two countries. We cannot apply one principle in one part of the world where our own interests are involved, and deny the application of the same principle in another part of the world where the higher interests of another nation is concerned.

If we go into Mexico, the precedent is created for Japan to settle her differences with China in her own way. If we recognize the force of the Carranza note which absolves the Mexican Federal Government from responsibility of the acts of the State of Puebla, we have undermined our own position whenever the anti-Japanese element in our Coast states again attempts to pass discriminatory legislation against the Japanese.

The repercussion of our Mexican policy will be felt immediately in the Far East. The precedents will be created which will provide Japan with the opportunity to settle the Far Eastern problem in her own way. And this is the penalty Americans will pay for the past five years of wobbling around, trying to muddle through one of the most delicate problems confronting the world, under the guidance of impractical and short-sighted amateur diplomats.

The only safe and sane procedure that can save American prestige in the Orient, is to revert to the policy of the President which was overruled and rejected by his advisers at Paris, and call upon the interested treaty Powers for a full

and frank discussion of China's problems at a special international conference. Our enemies are many. If we bait Japan in China, those who are intent upon our discomfiture will bait us in Mexico. We cannot have our cake and eat it too.

## China's Negative War

Under the above title, the "Chicago Tribune" recently printed an editorial inviting attention to a letter on the subject from Mr. J. B. Powell, Secretary of the American Chamber of Commerce at Shanghai. There seems to be a tendency to hail with a certain amount of satisfaction the boycott against Japanese goods in China, and it would appear from articles published in the American press, that this movement was being aided, or, at least approved of, by those Americans, new comers in China, in close touch with official circles. It is well to recall that this weapon was first employed successfully against American trade as a protest against our treatment of Chinese merchants and officials passing through the immigration fifth degree in San Francisco and other ports. The boycott inflicted considerable damage to American interests in China, and was the reason for one important American corporation passing under the British flag and protection. The boycott passed, but the original grievance remains as strong as ever. It is impossible to talk for any length of time with a Chinese merchant or official without his raising this question. Several experiences that have come under my personal observation, confirms the statement that this lack of discrimination on the part of American immigration officials still rankles in the hearts of Chinese officials. I can recall when Minister Koo first sailed for Europe with his secretaries, a most undignified incident was created by the New York Port authorities who demanded the papers to prove that these men were entitled to certain considerations, and again when a Chinese Minister, on his way to take up his post at Washington, was grossly insulted by the Health authorities at Honolulu, and held the passengers in the dining saloon for over one hour to compel the "Chinaman" to come out of his stateroom and pass inspection with the others. The Chinese Minister, standing on his dignity and waiting to receive the diplomatic honor of at least being "inspected" in his stateroom, was at last compelled to "lose face" and submit to the general rules. He was furious for many months afterwards. Then, as now, China is looking to the United States for moral and financial support. Consequently, they will not openly voice their displeasure of our exclusion laws and their practical interpretation.

We must remember that the so-called "racial question" is becoming each year more acute in our Pacific Coast States. To the complaints of the Chinese, is now added the resentment of Japan. Americans should always bear in mind their vulnerability on this grave question, and that a skillful propaganda carried on through the Japanese press in China against Americans, might arouse antagonisms and pave the way for another boycott against our trade. Conditions exist in China, which might be utilized by enemies or trade antagonists to turn the boycott against us again. The passive resistance of a boycott has been called the only effective weapon of a weak and defenseless people. But history tells us that every nation or people who have resorted to passive resistance, have, in the end, resisted themselves into vassalage or extermination. Americans in China and especially a Chamber of Commerce should be most careful in expressions of approval of this method of warfare.

GEORGE BRONSON REA.



# Mining in Hunan Province

A Sketch of the Principal Mines in the Province and the Mining Methods Employed  
by the Natives

THE attention recently drawn to mining affairs in Hunan Province by the signing of the agreement published in last issue for the development of mines, etc., in addition to the fact that a railway will certainly be built in the near future to open up the Paoking mining and agricultural district, add emphasis to the importance of the mineral deposits\* of Hunan and the potential development of the mining industry.

Mining has been carried on in Hunan Province for centuries, but it was only recently that improvements were introduced and people began to appreciate its real importance. Thanks to the demands created by the world war, the revenue derived from this industry now constitutes the chief prosperity of the province. The antimony mines of Hsik'uangshan (Tin Mine Mountain) and the lead and zinc mine of Shuik'oushan (Water Mouth Mountain) have now an output probably exceeding that of any other similar mines in China, and, since August, 1914, enormous quantities of antimony and lead have been shipped to Europe for the manufacture of munitions of war.

Important as these mines are, little is known about the mining methods or about the conditions in the mining districts. The following information is compiled from data supplied by the natives of the districts, especially two who have studied at Tsing Hua College, as well as the official reports of the Ministry of Agriculture and Commerce (Peking), the "Technical Magazine of the Mining Bureau of Hunan" (Changsha), and the "Eastern Miscellany," etc. Because of their comparatively greater prosperity only the largest mines, *e.g.*, the Tin Mine Mountain and the Water Mouth Mountain—are treated at length. The others are more or less summarised and condensed.

## Chinese Mining Methods in General

The following extract from a report made by Mr. A. S. Wheler, M.I.M.E., Mining Engineer for the Ministry of Agriculture, Industry and Commerce, in 1915, seems to hit off these methods admirably:—"A Chinese mine of the old type is a ragged hole in the ground off which numerous excavations of irregular shape have been made following the ore and working it out wherever found in sufficient quantity. The result is a sort of bewildering rabbit-warren of workings, usually none too safe, up and down which one clammers on

ladders and timbers affording a slippery and precarious footing or grasp. For explosives the native-made black powder is invariably used. For light, flare lamps are used. These consist of a shallow iron saucer suspended on one end of an iron rod and filled with vegetable oil in which are immersed wicks made from wood pitch."

The pumps used, however, are quite ingenious. They are generally made of bamboo, five inches in diameter, from which the inside rings have been cut out. This forms the pump barrel. The piston is a long strip of bamboo, to the end of which is fixed a leather disc of the same diameter as the bore of the bamboo. This acts as a flap valve and is sealed on a small disc of wood. The pump worker pushes the plunger, and the discharge end of the bamboo delivers the water into a small cistern on which he sits.

Development work is seldom or never undertaken in Chinese mines. Thus a reserve of ore is never created to tide over a rainy season. Hence when a poor zone is encountered, the mine simply has to close down for lack of funds. Practically all work is done on contract, whether mining, hoisting, or ore dressing. The methods of working as well as of control and direction of operation are left entirely to the contractors. It is really rare to find a manager of a mine who will venture underground or who has the necessary knowledge and experience to enable him to assume technical control, etc.

In addition to poor management there is also another factor which retards all progress, and that is superstition. This superstition may either be the belief in "Feng Shui" (wind and water geomancy), which decrees that certain localities are sacrosanct from shafting other operations, or it may be a belief in the presence of a god controlling all the resources underground. So before a mine is to be opened, this deity must first be worshipped or humored. If by a stroke of good fortune the prospectors succeed in discovering an ore, the success would be ascribed to the favor of the god concerned. On the other hand, should the efforts end in complete failure, or if an accident should occur within the mine, the inhabitants would conclude that the deity is in ill humor or displeased with some of the miners' conduct, etc.

It has to be remembered that Hunan has always been known to be rabidly anti-foreign, and it was only in recent years that the population could be persuaded to accept things foreign or adopt foreign methods.



A Native Antimony Mine near Paoking

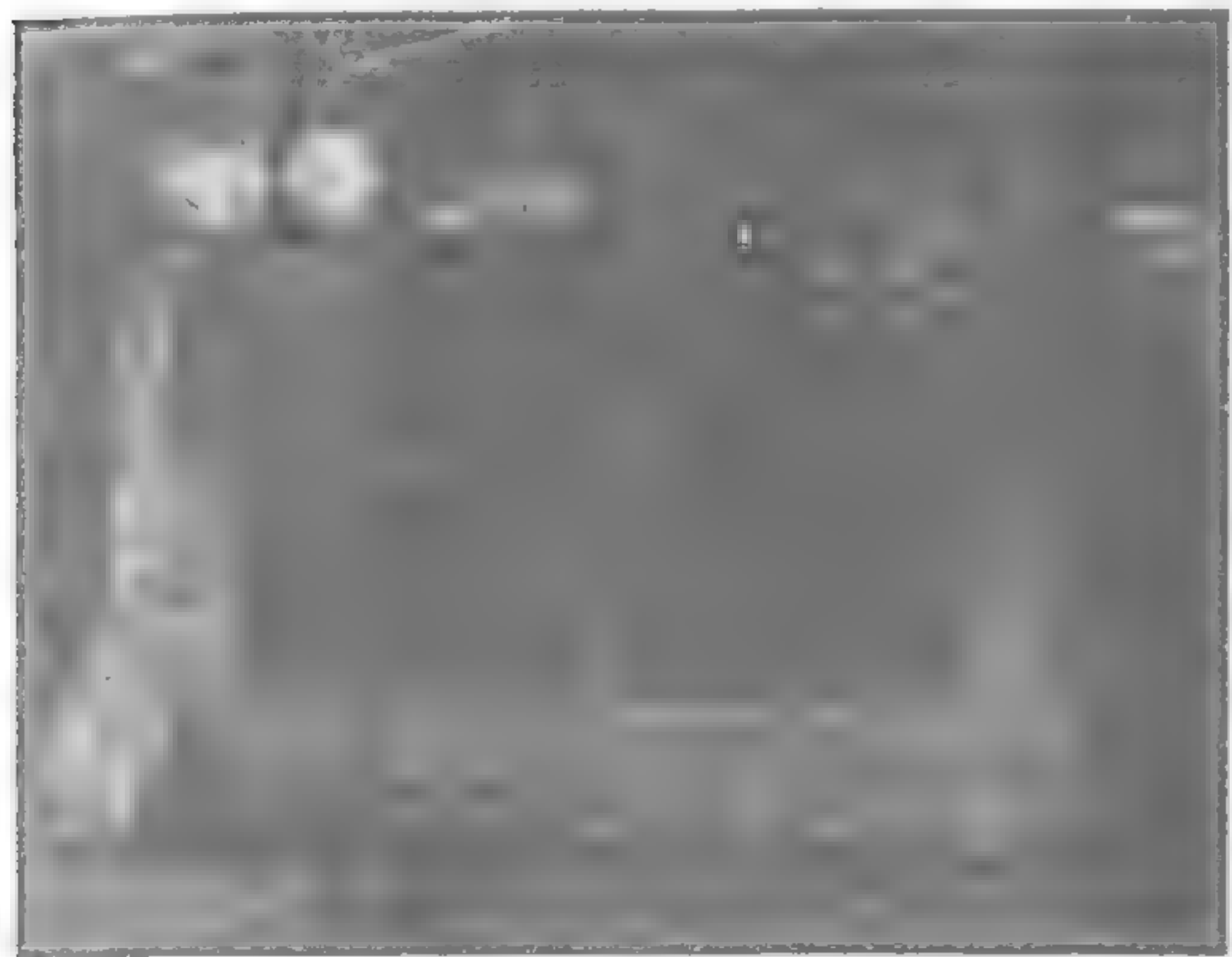
\* See FAR EASTERN REVIEW, September, 1915; October, 1916; December, 1917; June, 1917, page 489, December, 1918.



## The Antimony Mines of the Tin Mine Mountain

Hunan is rich in all sorts of metalliferous mines, but by far the most important mineral product and the foremost mining output is antimony. One estimate says that China is the world's chief producer of antimony, yet the production depends almost entirely on one insignificant hill, the Hsi-k'uangshan, or Tin Mine Mountain.

The Tin Mine Mountain, as the natives of the locality call it, is in the district of Hsinhua, in the central part of the province. It is sixty *li* (twenty miles) northeast of the district city. Thirty



A Native Furnace; Workman Stirring Antimony

*li* west of it flows the "Cold Water River," and sixty *li* northeast lies the Lantien Market, on the Lantien Creek, a tributary of the Lien River which empties itself into the Siang River. Therefore the output is transported in two ways: (a) from the Cold Water River on to the Tzu River, then on to Yiyang in an easterly direction, and thence to Changsha the capital city of the province, to be refined; or (b) from the Lantien Market down the Lien River, and up the Siang River in a northerly direction to Changsha. The former route is by far the longer, but with less land transportation. The latter, however, is shorter, but the land transportation is most difficult, owing to the lack of railways or even good roads. Besides, the country traversed is very mountainous, and the lot of the hard-working porters as they shoulder the ores and plod along in even the mildest part of summer, is far from being enviable. From Yiyang to Changsha the products are towed by steam-boats. The cost of shipping is about 1,200 to 1,800 cash per ton, according to the local currency.

The name of the hill is a strange one and invites questioning. It was so called during the Ming Dynasty (A. D. 1368-1644), because at that time antimony was unknown to the Chinese, who mistook it for tin from its close resemblance thereto. The inhabitants found the ore but were puzzled by the fact that tin could not be extracted from it. The enterprise was therefore not taken up and the precious metal lay dormant for centuries. It was only in 1896, the twenty-first year of Emperor Kuang-hsu, when Viceroy Ch'en Pao-chen of the province memorialised the Throne for the establishment of the official Hunan Mining Bureau, that work was restarted. The people were allowed to work the mines and officials were appointed to buy the ore and put it through metallurgical processes.

Originally the buying price was calculated at 1,400 cash per ton if the ore contained 70 per cent. antimony, or 1,000 cash per ton if the ore contained 50 per cent. antimony. Later, owing to the fixed prices, crude machinery and scar-



Pouring Crude Antimony at a Native Furnace

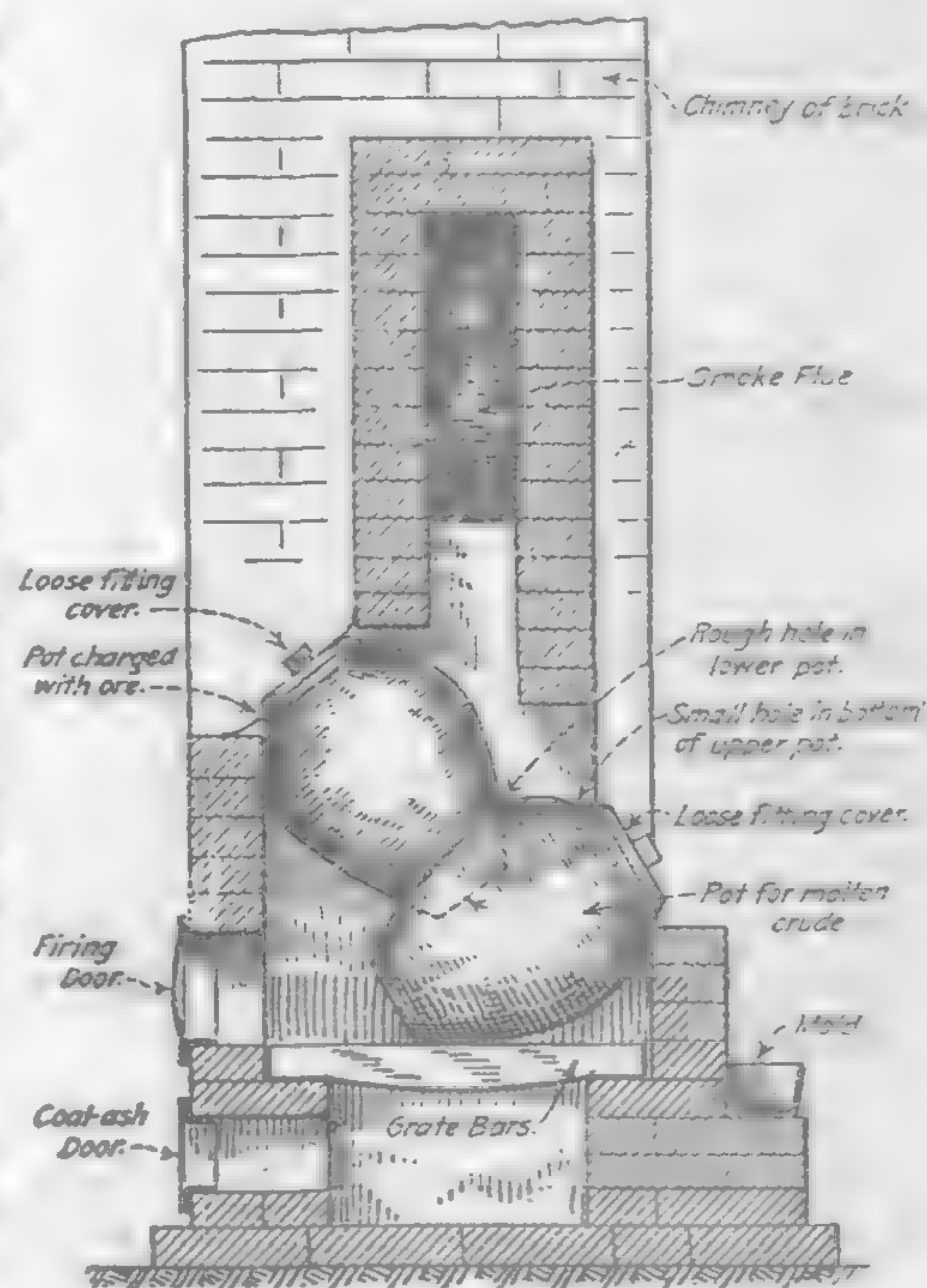
city of capital, the miners themselves sustained a heavy loss and the industry threatened to come to a standstill after only a few years. Shortly after, however, the provincial government's shares in the business were cancelled and the whole undertaking was placed in the hands of the people. Thenceforth the industry prospered and, in 1914, it took such a tremendous jump that it seemed to take the lead in all mining enterprises in this country.

Situated in a big range of mountains, the hill is a low hillock elevated about 200 feet from the plain. The prevailing geological formation here is dolomitic limestone. The ore is scattered among the granity rocks, there is no definite direction, and it penetrates into all fissures of the rocky foundation. Consequently the whole may be denominated as an antimony hill. Above the granite layer is a reef of over a mile in length. In the rocks there is a big cavity which shows clearly the former presence of water which had worn away the dolomite cliff. The stages of formation of the bed can now be only a matter of conjecture, but there is good reason to believe that the ore was precipitated by the ground water which formerly existed. This also explains why there

is no deposit in the chalk foundation but entirely in the granite layer. The ore is stibnite, or antimony sulphide partially oxidized in the outcrop zone, and occurs in the form of seams and masses. The whole hill is less than one square *li* in area and only 250 feet in height. But since the source penetrates far and wide, the supply seems at present almost inexhaustible.

As regards the methods employed by the miners, they are very crude indeed. Without any system or any idea of the exact whereabouts of the ore, the miners merely dig at random. Consequently the "pit-holes" make the hill look very much like honeycomb. Altogether there are about 100 companies working on the spot, but none seems to deserve the high-sounding name of a company or corporation. Besides these there are also "unauthorised ore tents." The ore is first bought by the companies from the miners. The crude antimony is sold and used for further refining, while the residue and the ore dust are sold to the tents. The material is then cobbled into small pieces and the stone is separated from the genuine ore. The dust or powder is first sorted by native jigging in baskets and then washed with water on an inclined plane. A rather pure antimony is then left and resold to the companies.

There are seven smelting works on the hill, but only one of these can produce pure antimony or antimony regulus. The others extract only crude antimony for lack of reverberatory furnaces. The ore is put into the smelting pot, the fire is built, and the ore melts. The liquefied ore is then drawn off through a hole at the bottom into another pot. The molten antimony is taken out with long ladles and cast into



Sketch of a Crude Antimony Furnace



ingots of crude antimony. Each row of furnaces (these vary from four to twenty-nine) can produce two tons of antimony every twenty-four hours, but the amount of coal consumed is almost one ton. The smelting is watched by two men who come on duty alternately every six hours, and it is computed that fully 1,000 men are directly employed. The furnaces, however, do not run regularly. Every day almost two-thirds of them are idle, either because there is no ore to extract or because the work is stopped for refining. The annual output is from five to six thousand tons.

Both the antimony regulus and crude antimony are transported to the Wah Chang Company at Changsha, for either smelting or refining. This company was granted the monopoly of the antimony regulus under the Manchu régime. "It owns the French patent rights for China of the Herrenscheidt furnace, which is especially adapted for the treatment of low grade sulphide ore. The process consists briefly in mixing the broken ore with charcoal and heating with regulated admission of air. The sulphide is then converted into oxide which is volatile and is drawn off, and condensed in special chambers. The oxide is then mixed with suitable fluxes and smelted in the ordinary reverberatory furnace. The molten metal is then carried with large ladles into moulds and allowed to cool slowly beneath a covering of slag. This produces the fern-like marks on the surface of the ingot which is held as a sign of freedom from impurities. But, as a matter of fact, it is not necessarily so. Chinese regulus runs from 99 per cent. to 99½ per cent. of metal when compared with the highest grade regulus in the world market."

Antimony ore is also shipped to Europe for treatment. There are many foreign agencies in Changsha directing this business. It is said that works have recently been established by foreign companies in Hankow for the production of antimony crude regulus. Hunan ores are reported to be remarkably free from deleterious impurities, such as lead, copper, arsenic and zinc, etc. The following export figures from Changsha for 1911-1915 are instructive:—

			Regulus.	Crude.	Ore.	Refuse.
1911	...	piculs	26,309	121,716	8,417	17
1912	...	"	33,802	90,485	11,424	17
1913	...	"	35,381	116,155	70,039	105,756
1914	...	"	45,948	246,585	156,979	42,890
1915	...	"	97,642	247,443	15,221	83,193

On account of the increasing demand for the metal in the manufacture of munitions of war, and especially as the other producing centres in the world were not in a position to maintain their outputs, the prices soared sky high. In July, 1914, it was only £27 per ton in London, but in December it rose to £55, and in the following June it leaped to £150 per ton. Such soaring of prices literally created a mania for antimony mining in the whole province. Everybody wanted to get rich quick, and one and all dreamed visions of unbounded opulence. A few enterprising individuals reaped monstrously rich returns, though most speculators cursed their luck. But until the arrival of the final crash, such soaring of prices reacted at once on the economic conditions of the mining neighborhood. Nearly every commodity in the district trebled its original price, and rice, which a few years previously fetched about \$3 per picul, reached an average of \$8 per picul. Even water was sold for five coppers per tub, because water was scanty and the quantity daily consumed by the various companies was enormous. Then the reaction came and the sudden drop in prices proved disastrous for most people. This is borne

out by the Customs Trade Report for the port of Changsha for 1916, as follows:—

"The most important local article of export was antimony which, like many other native products, though shipped in the first instance to Hankow, is intended for eventual export abroad. The export of antimony regulus showed an increase of 8,673 piculs as compared with the figures for 1915. There was a decrease in the shipments of crude antimony and ore, but this was probably due to the local smelting which began in 1915. The export of antimony refuse, which requires more skilful handling than rich ores to obtain paying results and can scarcely be worked economically by the local smelting plants, showed an enormous increase, the figures being nearly three times those for 1915. The antimony market opened with a good demand at about 900 Hankow taels per ton for regulus (with proportionate prices for other forms of antimony), and the quotations remained between 800 and 900 taels until the end of April, when the demand suddenly ceased on the flooding of the world's market by the enormous production of Bolivia, and prices dropped to 450 taels at the end of May and 250 taels at the end of July. From that time there was little change, and the year closed with prices varying from 200 to 250 Hankow taels per ton of regulus. In 1914 Bolivia had an output of only 186 tons of antimony ore, but owing to high prices, good demand and rich deposit, this was increased in 1915 to 17,923 tons of ore, at an average percentage of about 60 per cent. metal, which was all taken up. However, when Bolivia further enormously increased its production in 1916, the market was glutted and prices came down with a run. Changsha suffered severely, as no long period contracts had been made; many mines had to be closed, and holders of stocks lost heavily."

Prospects for the future, continued the report, are bad, for, though prices abroad are double those prevailing before the war, the high rates of sterling exchange gave a poor outturn in silver, while the cost of labour for production, transport expenses, etc., have increased very greatly so that little profit is left to the mine-owner. How far the above prognostication is substantiated or qualified is illustrated by the following export figures compiled for the whole of China by the Chinese Maritime Customs, especially as the price of silver has been steadily rising since 1916:—

	1916		1917		1918	
	Piculs.	Tls.	Piculs.	Tls.	Piculs.	Tls.
Antimony regulus	173,137	6,912,144	245,068	3,714,321	237,796	2,117,916
Antimony crude	197,965	4,911,359	333,026	2,346,841	28,193	119,820
Antimony ore	194,525	1,383,243	63,813	237,702	7,939	21,810

In other words, as the Trade Report for 1917 remarks: "Antimony, regulus and crude, increased by 56 per cent., but the value had declined considerably in consequence of the difficulty of procuring freight and because the European demand was being supplied from Bolivia and elsewhere. The greater part of the export took place earlier in the year." And an analysis of the same trade for 1918 (see FAR EASTERN REVIEW, September, 1919) leads to the following deduction: "Antimony was a war need, and was drawn from China in great quantities before rising prices and high ocean freights on the one hand, and adulteration or poor quality to a slight extent, on the other, made it advisable to make purchases abroad when foreign supplies became available. In 1916, exports of regulus were 173,137 piculs valued at Tls. 6,912,144; of crude 197,965 piculs valued at Tls. 4,911,359; and of ore 194,525 piculs valued at Tls. 1,383,243. What



has befallen the trade since then is graphically shown" by the above-cited figures.

The following extract from the Chinese Maritime Customs Report for 1918 will indicate the present outlook for antimony mining:—

"*Changsha*.—With the enormous demand for antimony regulus during 1918 came the setting up of a considerable

In addition to Hsinhua, deposits of antimony have also recently been discovered in the districts of Anhua, Yiyang and Yuanlin, etc. The output from these mines is comparatively small, the average per month ranging from 50 to 300 tons.

### The Lead and Zinc Mine of Shuik'oushan

Unlike all other mines in the province, the lead and zinc mine of Shuik'oushan (Water Mouth Mountain) is run on foreign lines, and is probably the largest of its kind in all China. It is located in southern Hunan, in the district of Ch'angning, about 45 miles southwest of Hengchowfu, and on the south or left bank of the Siang River. About 10 li from the mine is a rural market called, literally, the Cyprus Village. The vicinity is rather a level place, the highest part of the hill being about 200 feet above the surrounding plain. The mine produces galena and zinc blende as well as a less valuable by-product, iron pyrites, which can be used for making sulphuric acid or extracting sulphur.

Historically the mine dates back to the Ming Dynasty, like the Tin Mine Mountain—an assertion which is amply demonstrated by the numerous deserted pits scattered around the region. It is said that at the end of that dynasty the mining industry was at its highest stage of development. Thousands of workmen were employed and the Cyprus Village was busier than it is to-day. As a consequence, however, of the shortage of capital but especially of the disorders and rebellions which reigned towards the end of that period, the various companies ceased all work.

The principal ores of the mine are zinc-blende and galena. These exist in big troughs of rocks. The biggest bed is about 1,200 c.m. in capacity—a rare treasure of its kind. The best specimen of galena contains 73.3 per cent. of lead, 4.7 per cent. of zinc and 929 grams of silver per ton. The zinc-blende contains 23 per cent. lead, 53.4 per cent. of zinc and 160 grams of silver per ton. Such abundance of ore combined with such richness of valuable metals at once makes the mine a first-rate source of revenue for the province.

As in the case of the Tin Mine Mountain, it was only in 1895-1896 that the provincial government became aware of its importance. An official was appointed to take charge of the undertaking and Tls. 30,000 was appropriated for its improvement. The area within 100 li radius of Shuik'oushan was chartered as the privileged district for government



Map showing Location of Shuik'oushan

number of small and cheap native 'plants' for smelting purposes. They consist of a coke-kiln fire which collects the fumes in claybuilt chambers, draught being supplied by hand-driven fans through wooden ventilators. The production per furnace as compared with that of the steam power driven plants, with cast iron collecting chambers, is exceedingly small, but the competition of these native "plants" in production cannot be overlooked when it is realized that they cost next to nothing to erect and how cheaply they can be worked by coolie labor. Towards the end of 1918 only the richest of the antimony mines were able to work, and this at a loss, for the price of antimony declined rapidly with the advent of the termination of hostilities in Europe, when regulus was offering at Hankow Tls. 60 per ton. This represents one-twentieth of the metal easily obtainable in 1915, one-fifteenth that in 1916, and one-fifth that in 1917."

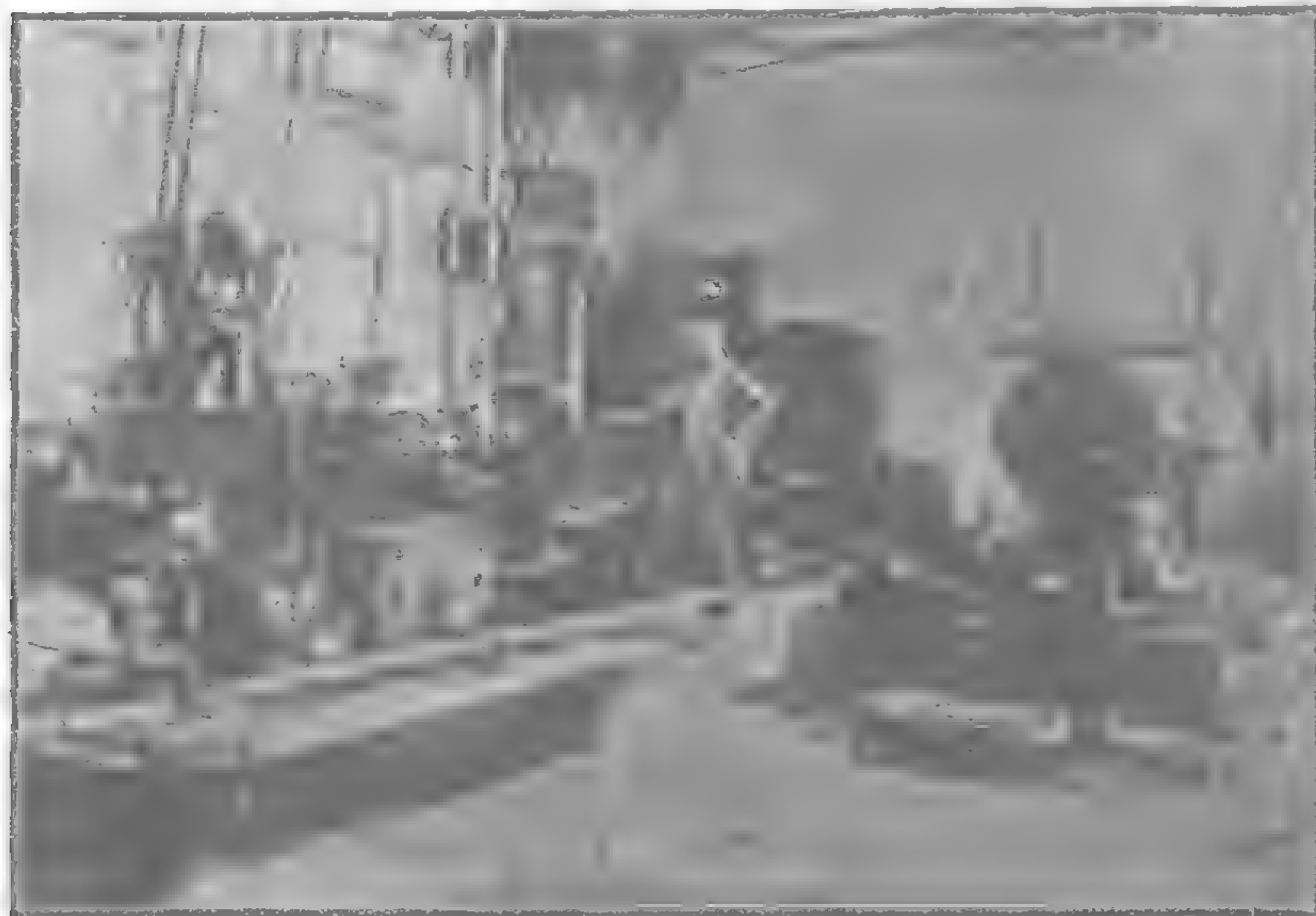
As usual, owing to lack of organization and ignorance on the part of the miners, the sanitary conditions of the Tin Mine Mountain are most unsatisfactory. Thousands of diggers live huddled together in tents or wigwams, around which were huge heaps of refuse and waste products. No scavenger could be found. Every one was busy picking up antimony ore in order to bargain with the mining companies. The latter likewise were too busy with money-making to care about the health or living conditions of their workmen. It is said that one could smell the foul air and bad odour even a mile away!



Jigs in Concentration Plant



mining. The people were free to live therein but were precluded from starting private mining. As the official appointed was conservative the usual crude native methods



The Machine Shop

were employed. Yet the ore was reached after a few months' digging and, despite the absence of modern machinery, netted highly creditable results. The output was doubled the following year and then jumped to seven times as much at the end of the third year.

In 1907, the Government decided to introduce modern equipment, and machinery was bought and shipped to the spot from Europe. Owing to the irregularity of earlier mining, the work was at this stage much handicapped. For example, places where a vertical cut is desirable are forced to have a sloping shaft. Nevertheless, in spite of these and other similar inconveniences, the output has increased from 10,000 tons at the time of modernization to a production now reaching more than 20,000 tons. The following table shows the annual output and expenditure from 1896-1914:—

Year.	Zinc-blende.	Galena.	Iron Pyrites.	Total Annual Expenditures.
1896 ...	527 tons	230 tons	212 tons	Tls. 31,597
1897 ...	196 "	1,285 "	45 "	" 32,857
1898 ...	3,675 "	1,884 "	103 "	" 33,964
1899 ...	4,571 "	3,036 "	104 "	" 47,737
1900 ...	5,822 "	2,791 "	205 "	" 54,239

Year.	Zinc-blende.	Galena.	Iron Pyrites.	Total Annual Expenditures.
1901 ...	4,806 tons	2,260 tons	216 tons	Tls. 57,412
1902 ...	5,721 "	3,627 "	252 "	" 56,802
1903 ...	5,309 "	3,670 "	885 "	" 70,237
1904 ...	5,558 "	2,342 "	58 "	" 66,172
1905 ...	5,178 "	2,079 "	59 "	" 79,115
1906 ...	6,662 "	1,792 "	47 "	" 106,034
1907 ...	10,011 "	2,910 "	34 "	" 109,576
1908 ...	8,124 "	3,088 "	39 "	" 106,865
1909 ...	8,483 "	2,553 "	83 "	" 116,122
1910 ...	7,787 "	2,527 "	44 "	" 118,068
1911 ...	9,498 "	4,035 "	97 "	" 144,826
1912 ...	9,444 "	2,987 "	339 "	" 206,848
1913 ...	10,319 "	3,148 "	182 "	" 498,892
1914 ...	17,454 "	5,777 "	50 "	" 496,999
Total ...	129,454 tons	51,316 tons	2,354 tons	Tls. 2,333,362

For 1915 the following figures indicate the monthly output for the first seven months:—

	Galena.	Zinc-blende.	Monthly output Total.
January ...	738.0 tons	2,040.6 tons	2,778.6 tons
February ...	727.2 "	1,867.6 "	2,594.8 "
March ...	217.5 "	2,025.8 "	2,243.3 "
April ...	042.1 "	3,634.1 "	3,676.2 "
May ...	1,114.4 "	2,061.9 "	3,176.3 "
June ...	849.9 "	2,376.3 "	3,217.2 "
July ...	1,000.9 "	2,005.2 "	3,014.1 "
Total ...	6,587.0 tons	15,032.5 tons	21,615.5 tons

That is to say, the prospects of the lead and zinc mine are promisingly bright. In 1914, the total output amounted to 23,231 tons as compared with 13,483 tons in the previous year, the expenditure being about the same in both years. This is because, in 1913, a special fund was invested for renewing as well as increasing the machinery. Since the establishment of the official Mining Bureau in 1896 to 1914, a total of over two million taels was expended. But the money had been well spent. For in addition to 2,300 tons of iron pyrites, a total of 180,000 tons (in round numbers) had been mined. If we put the average price during 19 years at 20 taels per ton, the value is already Tls. 3,600,000—in other words, a profit of over one-and-a-quarter million taels.

After the outbreak of hostilities in Europe all articles that could be used in war rose tremendously in value, especially lead, zinc, copper and iron. Before August, 1914 lead was worth \$10-20 per ton; twelve or eighteen months later it jumped to over \$100 per ton. The Shuik'oushan mines, it would be suspected, must have profited enormously from



Shuik'oushan Lead and Zinc Mine and Modern Metallurgical Plant



this golden opportunity. As a matter of fact, however, the reverse is the truth, owing to the one-sided agreement made between the Manchu government and Carlowitz & Company (a German firm). The contract provided that the mines should supply the German company with 100,000 tons of



Shuik'oushan Mine, power plant and Workshops

lead and zinc ores at the price of \$20 per ton, all fluctuations in the market value notwithstanding. Moreover, until the contracted quantity had been delivered, the mining company could not carry on any other kind of enterprise. These stipulations virtually made the provincial government a contractor for the Germans, and under the circumstances, enormous losses sustained by the mining company can well be appreciated.

According to the "Technical Magazine" of the Hunan Mining Bureau of October 31st, 1919, the daily output is now 20 tons of lead, 40 tons of zinc, or approximately 150 tons of ore and dust, etc. The price of zinc is ten taels per ton and that of lead, forty taels per ton. The total number of workmen employed is between five and six thousand. Owing to the recent fighting between the North and South in the province which seriously unsettled the available markets, there has been very small demand and, in consequence, the company has sustained a loss of over \$100,000. Much of the machinery requires immediate renewal, but there are no surplus funds for the purpose. At present the concern is exercising the strictest economy and, wherever possible, the men would only work half-time. The company itself has a police force of over 80 men, and in addition there is the protection afforded by a battalion of soldiers from the Third Division of Chihli troops who are quartered in the



View showing the New Mill at Shuik'oushan

Cypress Village. The locality is calm and peaceful, but business is very slack, and such pleasure resorts as tea-houses and "flower-boats" have already long disappeared.

### The Mine Workings

Until 1914 there was only one cut, so the output was limited; but in the winter of that year another shaft was made, connecting all the horizontal pits of the first cut, so as to increase the haulage. The first shaft is a slanting cut, forming an angle of 51 degrees with the water level. For years the whole mine depended upon it, so it has grown to be 192 meters deep, with six horizontal cuts branching out from it. The longest and most productive of these cuts is No. 4, which is 390m. long; the shortest is No. 5, which is only 41m. long. At the mouth of shaft is a headgear with a hoisting machine of 50 H.P. This reaches down from the surface of the ground to the fourth horizontal cut, and at its best it can haul a load of two tons, forty times per hour. Theoretically it can raise 400 tons of ores, but in practice the time required by the workmen for their rest must be taken into consideration and so, on an average, its capacity is only 100 tons. For the fifth and sixth cuts there is a smaller hauling engine.



View of the Power House and Main Incline Shaft, at Shuik'oushan

The mining method adopted here is what is called "overhand and underhand stoping." After a layer of the ore is exhausted, the abandoned cavity is filled up and the cut is continued into a new stratum. Formerly, before the introduction of modern methods, the cuts were irregular and the exhausted cuts were not properly filled up. These resulted in numerous impediments and sometimes even accidents.

In the first shaft there are about 600 miners. These work eight hours a day, one-third being employed in digging and cutting the ore, and the rest in hauling, etc. The men are mostly good stone masons, and cutting through 4 c.m. of chalcocite rock, limestone or granite will bring in \$34 as wages per month. The explosives, lamp and oil, etc., are not provided by the company, each miner having to procure his own. The engineering department only supplies them with the necessary tools, such as wedges, hammers, and drills, etc. The men organize themselves into groups of five or six, with one leader who is responsible for all transactions with the Mining Bureau. The stoutest fellow receives a wage of 40 to 50 cents "small money" per day, but the average gets about 30 cents. The explosive used is the ordinary gun-powder manufactured by the Bureau itself. It can be had at a price of \$1 for eight catties.



The horizontal cuts are each 2m. in height, and as already mentioned their lengths vary from 41m. to 390m. The vertical distances between them are generally 20-25m. apart. The main shaft reaches only to the fourth cut. The fifth and sixth cuts have a different outlet above.

Timbering is seldom used, because of the hardness of the chalcite foundation. But there are also soft points which require artificial supports. These usually consist of pine wood six inches in diameter, which mostly comes from the upper region of the Siang River where timber is cheap.

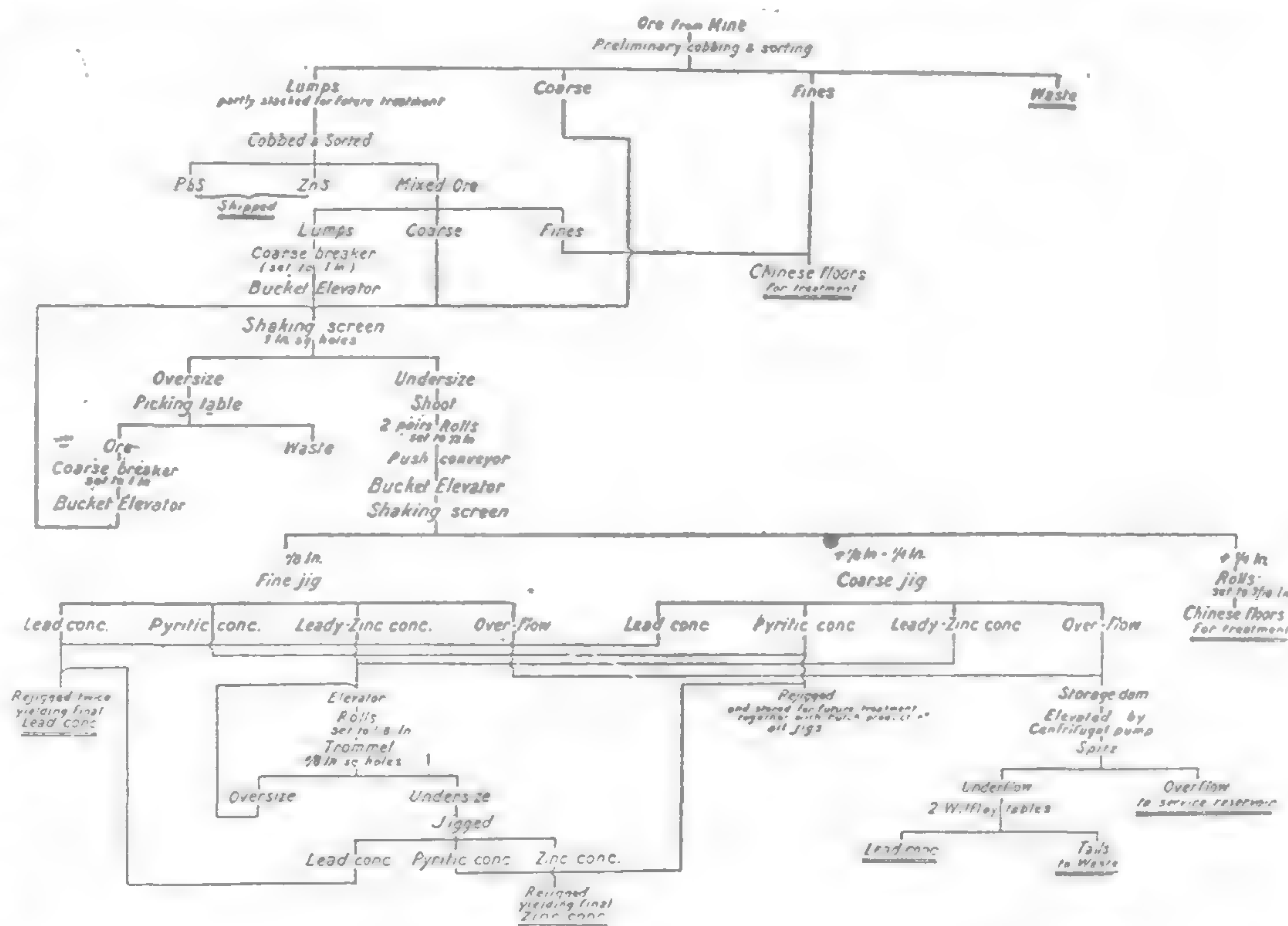
As for ventilation the excavated cuts usually serve the purpose admirably. Altogether there are two of these—one leading from the surface to the fourth cut, and the other from the latter to the sixth cut. These ventilation cuts are all sloping. The outlet is 50-ft. lower than the mouth of the main shaft. By a difference in air pressure as well as in density, the cold air goes in from the ventilation duct and comes out from the main shaft mouth.

From the first to the fourth horizontal cut water does not cause any trouble, but the fifth and sixth are full of water. For this purpose there are six pumping engines three in the first cut, two in the fourth, and one in the sixth. These pumps are operated by steam power, the capacity of each being 200 gallons per hour. The steam is conducted through iron pipes from the boiler on the surface ground.

In the underground workings all machinery emplacements and inclined shafts are provided with electric lights. For actual work, however, each man has to provide his own bamboo lamp filled with vegetable oil—a harmless enough means of illumination, since there are no inflammable gases in the mine to cause explosion, etc.

In case of death from mining accidents the Bureau will grant an allowance of \$30 to the deceased's family, whereas

if he is wounded or disabled temporarily, an allowance of 15 cents a day will be given him until his complete recovery. But in every case the leader of the group must first report

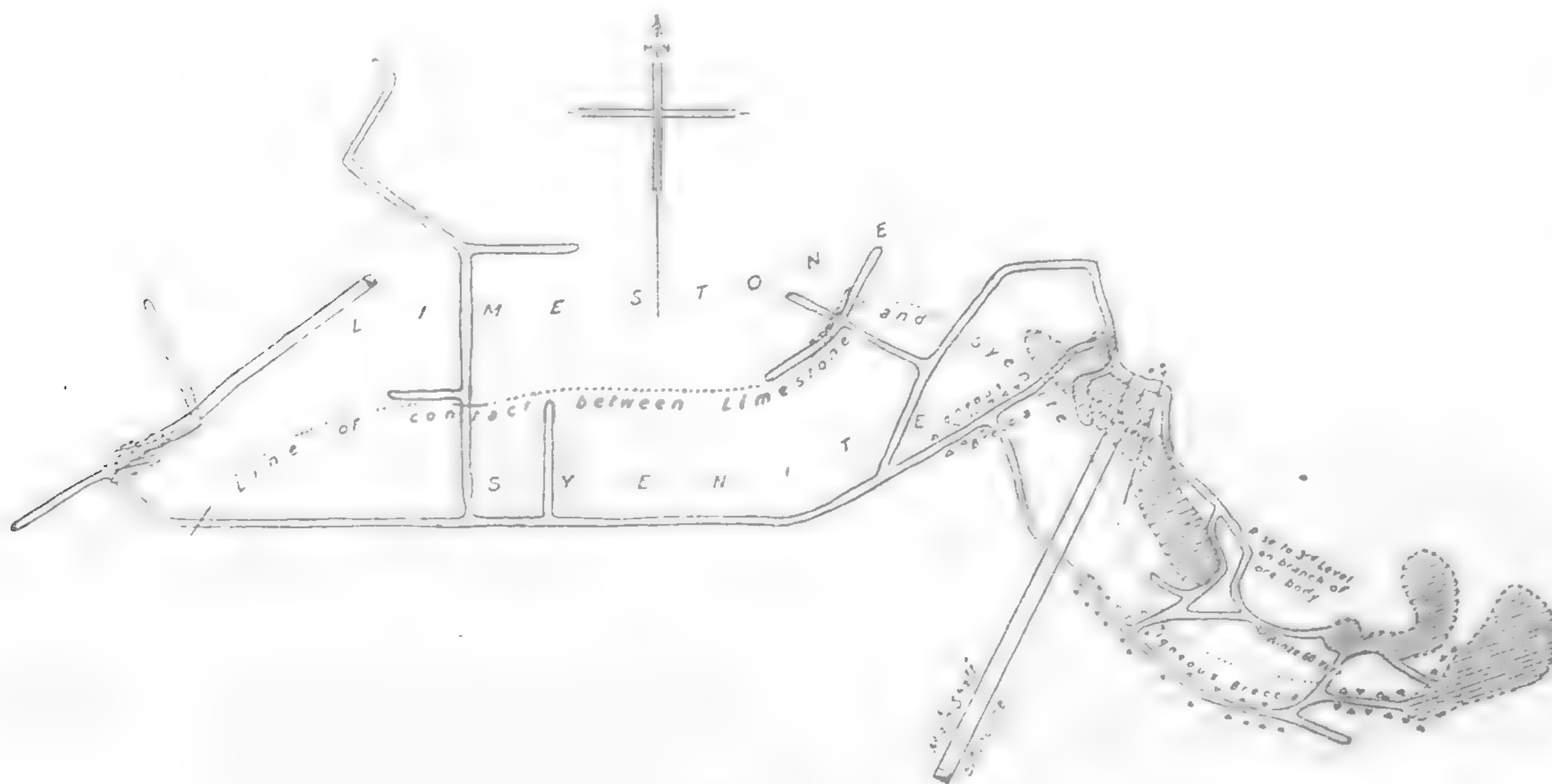


Flow-Sheet at the Modern Dressing-Plant at Shuik'oushan Mine

the matter to the director who will investigate into the case before granting the subsidy.

The second or new shaft is 500-ft. apart from the first or old one, and is almost vertical. In 1913 the work commenced. The mouth of the shaft is 2½ by 2 meters. It is divided into three parts—one for the elevators to travel, another for the steam and water pipes, and still another for the miners to work in. Some 19-ft. from the shaft entrance is a hoisting engine of 15 H.P. In addition there are also a boiler, a mechanical ventilator and pump. The boiler is situated on the surface ground and, giving a steam-pressure of 65-lb. per square inch, furnishes the power for the hoisting engine, pump and ventilating fan of this shaft. When the hoisting engine is worked to its highest speed, it can ascend three feet per second.

In addition to these two shafts there are the Hsinch'ung pit and the Lungwangshan (Dragon King Hill) mine. The former is only one li distant from the first shaft and is worked by purely native methods, the pumping, haulage, and artificial ventilation, etc., being entirely done by hand by lads of sixteen or so years of age. The latter is three li from the Shuik'oushan and is where the first outcroppings of the ore were found.



Plan of the Fourth Level, showing the Geological Features and Orebodies



The mines have four sorting plants—two being equipped with modern machinery—and also washing plants. The two that use hand labor are ore-crushing and sorting plants. The crude ore is first hauled to the surface, passing through the ore-crushing plant. The men hammer the ore and put it into different baskets so as to separate the useful product from the waste, and the more valuable from the less valuable. The waste, such as sand and rocks, is rejected and very pure high-grade concentrates of the lead and zinc are transported to the store-house of the station. The less pure portion is carried to the washing plant where mechanical sorting is employed. After this mechanical process, it undergoes another manual selection in the sorting plant.

The ore is hauled up by an elevator to the working place. By a revolving table it is fed into a breaker where it is crushed. Then it is carried into a Harz Jig. The particles smaller than one-fiftieth part of an inch are carried away to the sorting plant. The bigger ones pass through an elevator into another jig of greater meshes. The coarse particles are again put into a roller breaker. Then it is propelled by a carriage into another elevator, and then into another spray jig. The coarse particles left behind are crushed again and then carried to the sorting plant. Those smaller than one-eighth to one-fourth of an inch in diameter are put into the first row of sieves to be washed, and then into the second row. The fine concentrates are washed only by their difference in specific gravity. The substance is then transported to the store-house. The impure ore left behind goes through another breaker and thereafter to the store-house also.

The plant has two steam engines—one of 120 H.P. and another of 30 H.P. The steam is generated by four boilers. The machinery used, therefore, consists of hoisting engines, elevators, revolving table, power-jig, ore-breaker, ore-classifier, car, pump, centrifugal pump, sieves, steam-engine, boilers, Wilfley table settling tank, wooden troughs, etc. Owing to the increase in output, a new plant has been set up. It is of six stories and provided with two steam engines, six Wilfley tables, two jaw breakers, three crushing rollers, four elevators and one power-jig.

There are two crushing plants and the work done is entirely by hand. The men separate the various kinds of ore according to their specific gravity, color, hardness and fracture. The trailing is sent to the store-house, whilst the finer but lower-grade ore is sent to the washing plant. This sort of work is done by the job, and by boys of ten years or more of age. The wages, therefore, vary not with the amount of time but with the amount of work involved. The amount of ore to be sorted by each person is at least 65 catties and the wage therefor is 25 cash only! With an increase of every additional catty the wage is increased also by one cash, but if the increase be over 125 catties a special reward is given. These sorters work ten hours a day—from 6.30 a.m. to 12 noon and again from 1 to 5.30 p.m.—but their food is supplied by the Bureau. Thus taking it all together, each ton of ore costs approximately \$2 in hand sorting.

Manual labor is also found in the classifying plant, where the method of working is said to have been originated by the natives. The crushed ore is first put into a bamboo sieve (5 inches deep, 1.6 in. in diameter) of fine meshes and this, together with the sieve, is placed into a wooden tub full of water. The sieve is then shaken, when the particles will settle and arrange themselves in layers according to their respective specific gravity. Lead will be found at the bottom layer, then iron pyrites, then zinc, etc. The various layers are then taken off and separated.

For this purpose there is also another method. A slope or inclined plane is built with fire bricks, with two walls on each side and a pit in front (8 in. wide and 30 in. long.) A big water trough is then placed on top of the slope, and the ore is placed along the plane. The stop-cocks of the trough are removed and jets of water play against the slope, the particles being stirred with a bamboo stick. The ore is then washed down and settles in the pit in layers, as usual. But this method requires a longer time than the former method.

The mine has five workshops—the blacksmith shop, the machine shop, the manufacturing plant, the carpenter's shop, and the testing laboratory. The first supplies small and simple tools, such as drills and hammers, etc. It is, however dependent upon the other plants, doing chiefly the work of welding, polishing and repairing, but all by hand. It has three blast furnaces. The number of men in this establishment is 26, but in times of special need it may be increased to 40. The men are paid according to their skill and kind of work: the maximum wage is \$33 while the minimum is \$6 per month. The hours per day are 10.

The manufacturing plant is unpretentious, having two puddling furnaces, one blast furnace, one Siemens-Martin furnace and one elevator, which seem to be adequate

for its present needs. Castings up to one ton weight are turned out, and steam engines and pumps are made.

The machine shop has altogether only six lathes, three planers, four drilling machines, one air-pressure engine, and also one 32 H.P. steam-engine for starting other machines. Usually there are 40 workmen, but in case of necessity this number may be increased to 60. Their wages differ according to the grade of work—from \$5 up to \$40 per month. Like all the others, these also work 10 hours a day.

The carpenter's shop supplies and makes all the wooden frames as well as models for mining. There being very little work to do here, it has only four men. Their wages vary from \$4 to \$34 per month.

The testing laboratory was only recently established. Though small, it analyses not only minerals for the Shuik'oushan but also those of other mines along the upper portion of the Siang River.

Owing to the lack of good roads the problem of transportation was always a source of anxiety. In 1912, however, a light railway connecting the Shuik'oushan and the Cypress Village was constructed, at an expenditure of \$50,000. It is only 13 li in length and the journey occupies half-an-hour. Formerly each picul of ore cost 15 coppers to transport by



Chinese Method of Concentrating Galena by Washing Gangue away from the Crushed Ore



human labor from the mine to the village, but with the advent of the railway the cost has been reduced to 7 coppers per picul, not to speak of the saving of time, etc. The power of the locomotive being limited, it runs only five times a day, carrying 100 tons of ore daily to the Cypress Village. Thence to Changsha the ore is transported by sailing vessels or Chinese junks, since the river is too shallow for the steamboats to go as far as the Village. Later, when the Canton-Hankow line, which is to pass through this district, is completed, the means of transportation will, of course, be greatly facilitated.

### Tin Mining

The tin fields of Hunan are mostly situated in the southern portion of the province, close to the border of Kwangtung. The Anyuan mines in the district of Ichang produce perhaps the greatest output. The deposit here is of an exceptional nature and is said to occur only in three or four places in the world. The formation is of limestone insulated by granite mass. Along the granite dyke tin ore is found in abundance, although associated with arsenic pyrites, copper pyrites and fluorspar.

The ore is treated by cobbing and sorting. The clean arsenic is stocked for separate treatment. The balance is then roasted and the arsenic oxide is collected by condensation in dome-shaped chambers built of rough stone and plastered with clay inside. Then the oxide is poured into a thin iron basin or pan which is covered with a similar basin inverted, and subjected to intense heating. Thus the arsenic oxide will deposit on the upper basin. The roasted ore is first crushed by water-driven Chinese stamps and then undergoes a series of concentrations. The first of these is effected by raking the ore from side to side in a shallow stone pit into which water is constantly flowing. It is then concentrated by repeated washings down a concave-shaped inclined plane.

After the process of concentration the ore is put into the furnace for smelting. The furnace is built of stone and plastered with clay. The necessary blast is supplied by a pair of double acting Chinese bellows through a two-inch opening pointing downwards from the back of the furnace. The furnace door is stopped up with clay and a layer of live charcoal is placed on the furnace bottom and blown up to a good heat. About 50 catties of concentrates mixed with incense wood are charged in and covered with a layer of charcoal. The smelting occupies 24 hours, new charges and fuel being added half hourly. Shortly after starting, an iron rod is inserted into the clay furnace door so as to make a hole for the molten tin to flow out. The molten tin trickles out slowly into a clay vessel which is kept hot by live charcoal. Then it is cast into ingots of about 45 catties each, and the metal thus obtained contains over 99 per cent. tin.

In addition to Anyuan, tin mines are also found in both the north and west of the district of Lingwu, 50 li from its city. The latter, in the district of Kianghua, extends into

the provinces of Kwangtung and Kwangsi. The ore here is associated with tourmaline and arsenic pyrites. When smelted, it runs from 50 per cent. to 70 per cent. tin. As the ore is very rich, its annual output is said to be greater than even that of Anyuan.

### Gold Mining

There are several gold mines in Hunan. But the principal and most remunerative one of these is in the district of Pingkiang, near the Kiangsi border. It is about 30 li from Changsha. Although the concern is controlled by the official Mining Bureau, there are many small private workings on the hill sides. Most of these, however, have now abandoned their attempts as a result of either lack of funds or inability to fight the floods.

The principal mine is the Ching Tang (Gold Pond Mine), which has been worked to a depth of 650-ft. The enterprise is not run on the contract basis, but the miners are paid 214 cash per eight-hour shift and all tools as well as explosives are supplied by the company. The pump workers and ore carriers are, however, paid 164 cash per shift.



Chinese Dressing-Floors—Sluicing Down Boards for Concentrating

The process of treating the ore is first cobbing and then sorting. The sorted ore is put into a stamp mill, built like the Chinese rice mill, and then crushed by man-power. After crushing it is washed over two sets of riffle tables several times. The concentrates thus obtained are smelted into ingots of about 12 ounces in weight. The residue is ground in a small trough in which an iron disc is rotated back and forth by rolling the axle with human feet. The Chingtang mine has its own dressing floors. The official returns for the closing month of 1914 show that the grade of the sorted

ore was about .75-oz. gold per ton and that the output averaged about 120-oz. gold per month of a fineness of about 920th per 1,000.

Other gold mines exist at Hsiuhsienp'o, forty li north of the village of Taifu (Great Wealth), in the district of T'aoyuan; at Liulinchiao, 20 li from Shenchowfu; and at Yutung, in the southwestern part of the province. But the output is rather meagre.

### Quicksilver Mining

Quicksilver occurs in the west of Hunan, in the district of Fenghuangt'ing, on the border of Kweichow. The field spans the border of the two provinces. It was probably first opened several centuries ago, as the old waste and underground shafts seem to indicate. At present only two mines—the Wangtseping and the Tatungan—are in operation. The formation here is generally of dolomite or magnesian limestone. The ore is cinnabar or mercuric sulphide. The deposit is confined generally to a layer of dolomite ranging up to 6-ft. in thickness, though the cinnabar, associated somewhat with carbonic matter, occurs in small patches.



The picked ore is crushed by hand and then put into a pan and subjected to intense heating. Thus the cinnabar can be extracted. After extraction it is sold, according to the grade which is estimated by the eye, directly to buyers coming from Tungjen district, in Kweichow. The market price varies from 110 to 170 strings of copper cash per picul.

The poorer ore and the residue after panning are retorted for their quicksilver content. The retort consists of a thin iron basin about 30-in. in diameter, supported on stone pedestals. Two others from which the bottoms have been burnt out, are fitted into each other and placed on the lower basin. Then the uppermost vessel or basin is covered with a thin iron plate leaving a circular opening of about 12-in., and on this is placed an earthenware pot upside down. The crushed ore is placed into the lower basin. A circular channel of clay is moulded around the top basin to communicate with the interior of the retort by means of the three holes. When the ore is heated, the cinnabar separates into mercury and sulphur dioxide. The fumes of the mercury rise up and partly condense in the earthenware pot and partly pass through the three holes into the clay channel. Therefore the clay channel is the collecting ring. It is sold together with its contents to the company or merchants in order to defray the cost of furnace, basins, pots, etc. The amount so collected is stated to vary from 12½ to 15 per cent. of the total distillate.

### Sulphur Mining

There are several sulphur mines in Hunan, all run on primitive methods. The most prosperous ones occur in Ant'oushan, in the district of Sianghsiang, southwest of Changsha, and in Shuik'oushan, in the district of Tzeli, northwest of Changtehfu.

The sulphur is obtained by the destructive distillation of iron pyrites. The ore is first put into what are called sulphur pots. The pots are then arranged in an orderly manner in brick furnace and subjected to intense heating. The red hot coal is covered with a layer of coal ash. When the fire is burning fiercely, water is poured in from the top of the furnace, filling the pots half full of water. When the fire goes out, the furnace is destroyed and the pots are removed. By removing the clay on the brim of the pots, pure sulphur is obtained. The entire process requires one whole day.

The sulphur is generally iron sulphide. When the ore is heated, chemical action takes place and a part of the sulphur is set free.

### Coal Mining

Hunan is also very rich in coal. It is said by experts that its deposit is second only to that of Shansi in quantity, and especially is coal abundant in the southern and central portions of the province. Owing to lack of capital, and partly also owing to the quality of the coal, no mine has been operated so far on a large scale. It seems that, until last year, no anthracite was discovered; hence the anthracite of the Pinghsiang coal mines, across the border in Kiangsi, comes in to supply the factories, etc., at Changsha and

other manufacturing centres. The various small mining companies combined produced in 1916 an output of 932,000 tons.

According to Richthofen the whole of the southeastern part of the province may not be unjustly called one vast coal-field, although the coal formation is far from forming the surface rocks uninterruptedly: "It extends, according to the information I gathered in addition to my own observations, from the northern slope of the Nanling to near Siangtan—that is, through upwards of two degrees of latitude and about the same of longitude. The total area comprises about 16,200 geographical or 21,700 statute square miles. But unfortunately a great portion of its area, probably more than one-half of it, is covered by those sediments of many thousand feet certainly in thickness as being more recent in age than the coal formation, while a small proportion of it only is occupied by the more ancient rocks. Yet the coal measures themselves are invisible in extensive regions. The stratification is ordinarily much disturbed, a fact which has in many localities influenced disadvantageously the position and quality of the coal beds."

Last year (see the FAR EASTERN REVIEW, October, 1918) a new coal mining company was organized under the auspices of the present Tuchun, General Chang Chin-yao,

of the province, with a capital of four million dollars. It is a joint official and mercantile concern and will undertake the development of the coal fields of Ningsiang, northwest of Changsha, and Tsingchi. It has been known for some time that these two districts are very rich in coal deposits, but the natives use antiquated mining methods. Especially rich is the tract at Shuangssuling or Double Lion Ridge, covering an area of 30 square li. These fields are now reputed to produce excellent anthracite coal which is said to be unsurpassed in the whole Yangtze Valley.

### Other Minerals

Manganese is mined by the Hanyang Iron Works Co. for smelting with their iron ore. Graphite and alum is also mined, as well as tungsten. The latter, up to the signing of the armistice, was disposed of at prices ranging from \$1,000 to \$1,300 per ton. It fell to \$700 per ton with no buyers and since then production has virtually ceased.

### Forbes Perkins Co. to Handle Foreign Trade

All branches of foreign trade, including banking, railroading, exporting, importing and mining will be handled by the Forbes Perkins Co., which was formed with \$1,500,000 capital under an agreement dated October 8, 1919, by W. Cameron Forbes, ex-governor of the Philippine Islands; Charles E. Perkins, president of the Chicago, Burlington & Quincy Railroad; and John F. Perkins, treasurer of Calumet & Hecla Mining Co. The company, which has opened offices in New York at 120 Liberty street, will act as purchasing agents for a score or more of foreign railroads, mostly in South America. It is planned to obtain control of factories here and in South America. For the present the company's business will be chiefly in South America and China. The stock has been subscribed by a few men, whose names, other than the incorporators, could not be learned. The enterprise is being financed by private capital, it was stated, however, and is not backed by any banks, railroads or other corporations directly.



A Native Coal Mine in Hunan near Paoking. The Shaft is Covered by the Thatched Shed



# Reclamation in Hongkong

(From Our Hongkong Correspondent)

**T**HE most important question demanding solution in the Colony of Hongkong is that connected with housing. The steady growth of the Colony's population—a growth which has gone on since the early days of the British occupation—and the limited area of land available on the island of Hongkong, have created conditions which have caused severe hardships to those who wish to set up homes and businesses.

There has always been a scarcity of level land in the Colony, and this scarcity has made it necessary for a large amount of reclamation to be done. As early as 1851, that is, only ten years after the Colony's occupation, efforts to reclaim shallows from the sea commenced, 8½ acres being filled in between Wilmer Street and Bonham Strand West. The East Praya was reclaimed in 1873, and in the year 1884, 23 acres were added at Causeway Bay. In 1886 an area of 22 acres was reclaimed at Kennedy Town. Since that time the largest of the Colony's reclamations—the Praya—has been completed, thus adding another 65 acres to meet the land requirements of the Colony.

The need for space can be easily appreciated when it is remembered that every part of the building ground on this large area was covered with houses almost as soon as it was completed. Yet, in spite of all these reclamations and the rapid development of the Kowloon Peninsula as a residential area, the great problem remains unsolved. In some districts the overcrowding ex-

history of the Colony. This scheme is being carried out by the Kai Tack Land Investment Company. It was first conceived by Dr. Wu Ting-fang, the famous Chinese diplomat, and was fostered by the late Sir Kai Ho-kai, C.M.G.

Recently, by the kindness of Messrs. Little, Adams, and Wood, Architects, the writer was taken over the district to see the progress that has been made and to see something of



Site of Works—The head of the bay is being reclaimed

the great work which has yet to be done. The reclamation extends across the whole head of Kowloon Bay and covers an area of 230 acres. The contract for the first portion amounted to one and three-quarter million dollars. The Praya—or waterfront—will be over one and a half miles in length and there will be piers at which ocean-going steamers can be berthed at low tide.

The Praya is to be 175 feet wide, and the main central thoroughfare 100 feet in width. All the other roads intersecting the Settlement will be 50 feet wide. The Praya and the main central thoroughfare are to be lined with trees. A service of well-appointed ferry boats is to run to and from Hongkong island with stations at West Point, Quarry Bay, and Shaukiwan. An area of four acres is being laid out as a recreation ground.

The site is undoubtedly the most suitable for such a Settlement out of the island of Hongkong. It is situated at the head of a great sheltered bay, which at present is the refuge for the bulk of the shipping in the harbor when typhoons are our unwelcome visitors. Behind the Settlement are high hills—bearing familiar landmarks such as the Lion's Head—which in winter will give shelter from all the cold winds, while in the summer it will be open to all the cool breezes which blow across the har-



A Nullah in course of Construction

ceeds that in some of the slum parts of some of the world's great cities.

Across the harbor, at Kowloon Bay, there is now in progress the greatest work of reclamation yet attempted in the



ber. As a residential district the site will be ideal.

Mr. F. R. J. Adams, of the firm of civil engineers and architects already mentioned, under whose personal supervision the work is being done, says that the drainage on the reclaimed land will be an important feature. He pointed out the splendid nullahs—or waterways—which have been designed and are being made for the purpose of thoroughly draining all the back areas between the reclamation and the hills to the north. There are four nullahs—which will be the biggest in the Colony—each having a width of 36 feet, and these run through the Settlement. These nullahs have roads 40 feet wide on either side thus giving a total width of 116 feet. The nullahs are to be spanned by thirty or forty reinforced concrete bridges. The main front road or bund will be 175 feet in width and the main central road will be 100 feet wide. There will be other roads intersecting the Settlement 50 feet wide.

An important thing to note about the whole undertaking is that it is an exclusively Chinese enterprise. The primary object is to create a residential suburb where wealthy Chinese will be able to live in peace and comfort. With such an object in view it is certain to be popular, for the Chinese, no matter where on the earth's

surface they may wander to, always come back, if it is at all possible, to their own land. With the wealthy Chinese this modern city of the future will be a goal for "*otium cum*

one to which the Chinese are sure to flock. There will be plenty of room, for marked off on the plan are forty-seven sites, each of these occupying an area of from 179,999 to 200,000 sq. feet. So it will be seen there is room for residences of quite palatial dimensions with the necessary gardens.

Another point which will count for much with the Chinese is that the "*fung shui*," of the place is good. On the one side are the sacred rocks with the historic and famous Sung

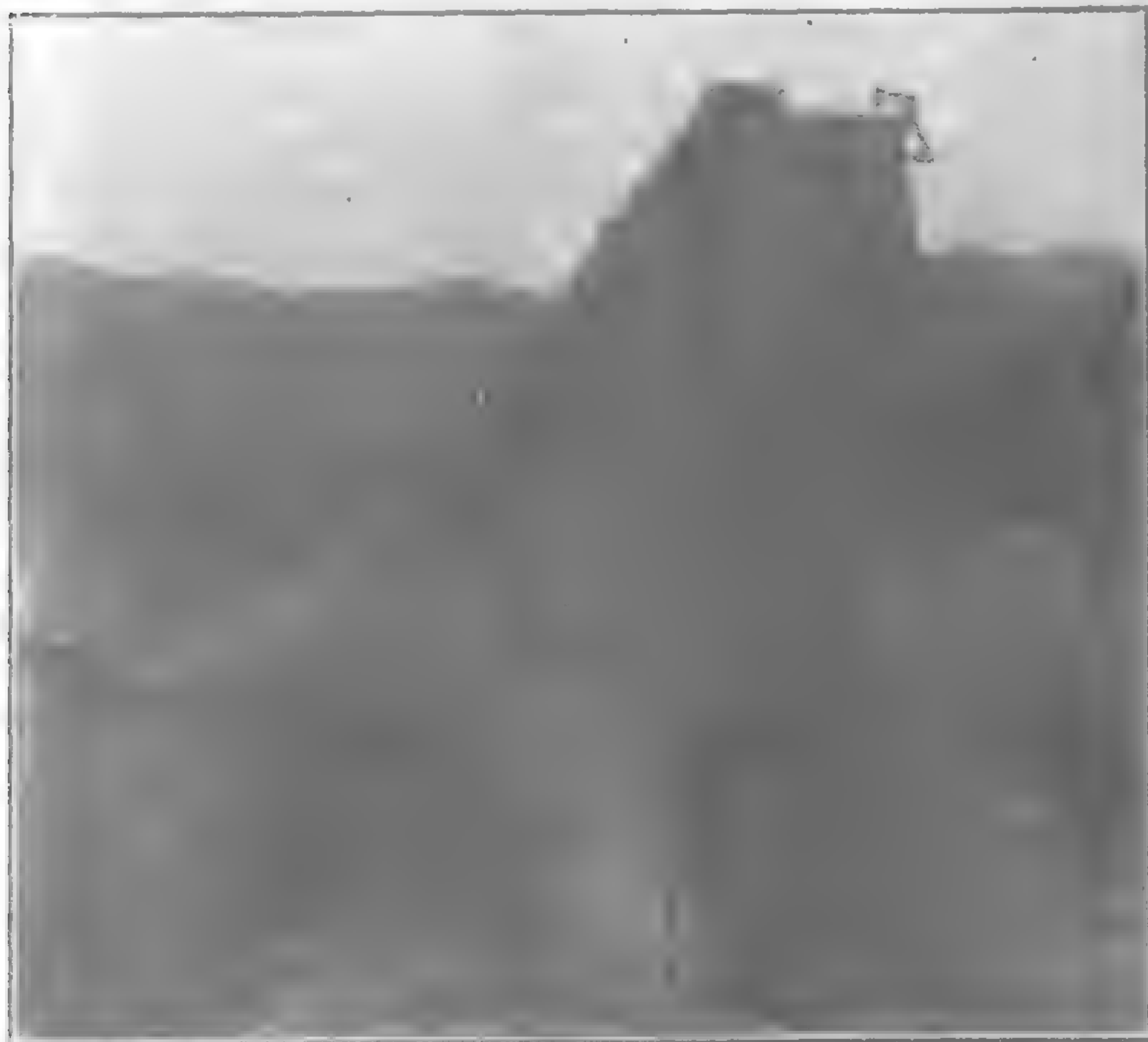


Showing Piling for Bridge and Nullah in Process of Construction

stone among them, and in the rear is the Lion's Head on the hills.

At the rear of the Settlement the promoters have reservations on lands which may at some future time be used for industrial works, and as the Crown lease allows the use of land for factories or godowns for storing coal, applications are already coming in.

Another advantage is that a larger area of level land is still available to the north of the reclamation and of the Custom's Pass, or Saikong Road, over the ground now embracing



Filling Shoot. Made on the spot by Chinese. The earth taken away here is used elsewhere for filling in

*dignitate.*" So that at present in the reclamation of Kowloon Bay we have the making of the foundation of a new township,



Cutting for Temporary Railroad

the villages of Pakuktsai and Ngauchiwan, around Hammer Hill, and the villages of Shatiunling, Ngaiutau, Pokong, Pakhang and Ngatsinwan to Kowloon City, most of which is now occupied for cultivation.



A regular army of Chinese workmen is at present engaged on the work of reclamation but a still greater army will be needed ere the work is finished. Near the Taiwan Glass Factory is a quarry from which splendid granite, used in the foundations, is obtained. The sea-wall is also made from the same.



Reinforced Concrete Stormwater Drains

A locomotive shed stands on the land so far reclaimed, and small railway lines run in all directions. Small engines are busy pulling heavy truck loads, the trucks, it is interesting to note, having been made by Chinese labor on the site. The East section of the area is now reclaimed and is ready for building on this year. The whole scheme is to be completed in five years. The work is a great undertaking but there is ample scope for such in the New Territory, and we cannot doubt that further development in this direction is assured.

### American Foreign Insurance Association to Enter China

The American Foreign Insurance Association is now making active progress in carrying out the plans for the establishment of the American fire and marine insurance companies in the foreign field. Announcement was made recently of the appointment of Allen W. Hexamer as marine manager for the republic of China. He will have his headquarters at Shanghai.

The American Foreign Insurance Association is composed of twenty strong American companies having aggregate capital of \$50,250,000 and total combined assets of over \$387,000,000. The companies which are members are the American of Newark, the Boston Insurance Company, the Continental of New York, the Fidelity-Phenix of New York, the Firemen's of Newark, the Fire Association of Philadelphia, the Fireman's Fund of San Francisco, the Glens Falls of Glens Falls, N. Y.; the Great American of New York, the Hartford Fire of Hartford, the Home of New York, the Insurance Company of North America, the National of Hartford, the New Hampshire Fire of Manchester, N. H.; the Niagara Fire of New York, the Phoenix of Hartford, the Providence-Washington of Providence, the Springfield Fire and Marine of Springfield, the St. Paul Fire and Marine, and the Westchester of New York.

Mr. Hexamer, who has just been appointed marine manager for China, is at present marine manager for Fred S. James & Co., and has resigned that position as of

December 1. He started in the marine insurance business in September, 1910, with Mather & Co., in average adjusting. In October, 1913, he went with Edgerton Parsons as manager of the loss department and continued with the succeeding firm of Parsons and Eggert until October, 1914, when he entered the brokerage end of the business, handling all classes of marine business. He joined the Fred S. James & Co. office on March 1, 1919, as marine department manager.

Mr. Hexamer has been a member of the Naval Militia, First Battalion, since June, 1912, and when the war broke out he entered the United States active service as a commissioned ensign, subsequently becoming senior lieutenant. He served in active duty doing convoy on the U.S.S. *Louisiana* and later saw service in the Bay of Biscay, English Channel and North Sea. In December last he was detached and went on duty with the salvage section of the Bureau of Construction and Repairs. He was ordered to inactive duty February 28, 1919, and immediately returned to the marine underwriting field, joining the James office.

He has had a wide range of experience and is generally looked upon as a capable man well qualified for the important post for which he has just been selected by the American Foreign Insurance Association. He is a member of the Marine Insurance Club, the New York Athletic Club and the Association of Average Adjusters. He will make his headquarters in Shanghai, but will be called upon to travel extensively among the principal ports of China while establishing the association in this country, where it will write marine, inland marine and fire risks. Mr. Hexamer is not entirely unfamiliar with the Far East, having already been in the Philippines and Japan.

The American Foreign Insurance Association has already established connections in Australia, New Zealand, Argentina, Brazil, Chili, Colombia, Japan, China and the Philippine Islands.

### How to Sell Steel Products in the Dutch East Indies

Some hints on the exploitation of the market for steel products in the Dutch East Indies were recently given by United States Trade Commissioner John A. Fowler. He says there is no question about the amount of business in this line that can be done in Java and Sumatra. With 200 or more sugar centrals, thousands of miles of light rails are constantly needed, and under the present plans of the Dutch East Indian Government 10,000 miles of railroads will eventually be built. Government work planned during the next four years will alone require 45,000 tons of cast-iron piping, to say nothing of the private needs of oil companies for pipe lines, and the demand for reinforcing material in concrete construction work. As soon as conditions become somewhat normal, new mining ventures will be opened up in what is potentially a great mining country, and the supply of machinery for this work will come entirely from abroad.

Mr. Fowler emphasises that there are opportunities for firms to get into business on a basis of service rather than price, as adopted by the Germans, who kept a stock of material, and engineers ready to sell any quantity of rails laid in the field and equipped with all the rolling stock required. The only practical manner in which new machinery can be introduced, writes Mr. Fowler, is to give the factory some guarantee of satisfactory results, and back up the guarantee by placing an expert on the job to see that the natives operating the machinery learn to run it with the required skill. The type of man to do this work must not only be an expert in the mechanical phases of his machine but also an expert in the handling of men, particularly the native workmen.



## Engineering Features of New Extensions on Japan's Railways

JAPAN, which forms the crest of a submarine range in the Pacific, is traversed from end to end by the broken ranges of mountains, one of which comes from Saghalien and the other from China via Formosa. The two chains meet in the centre of the Main Island, and, with the Fuji Group cutting across them, constitute the axial range of the Main Island known as the "Japan Alps." These rugged ranges divide the Main Island into two parts—Southern, or the Pacific seaboard, and Northern, or the seaboard of the Japan Sea. These divisions are, again, subdivided by various branches of the range and distinct chains, some of which fall abruptly into the sea. The natural configuration, therefore, leaves no extensive plains, and the rivers are mostly short mountain torrents.

This brief geographical description of the country will be sufficient to give an idea of the difficulties attendant upon the construction of railways, which are largely of mountainous nature, and it may also explain the prevalence, on the Japanese railways, of the ruling gradient of one per cent., sometimes 1 in 30 to 40, together with the presence of numerous tunnels, curves, and cuts and high embankments. This is particularly the case with the extensions undertaken under the new régime, mostly with the object of linking up the existing lines or affording a commercial outlet to remote and isolated parts of the country. Two of such extensions stand conspicuous—the Central Line, which traverses the high land of Middle Japan, and the San-in Line, which runs along the rugged coast of West Japan

trunk lines running north from Tokyo—the North Eastern Main and the North Eastern Coastal Line, are designed to bring the coast of the Japan Sea into rail communication with the Pacific seaboard, and farther north the Shinjo Line built for a similar purpose. All these lines are for the most part in mountainous regions and serve as an explanation for



Tokuzawa Bridge, 300-ft., on the Ganetsu Line

the rise in the cost of construction subsequent to the nationalization of the lines.

The engineering features of some of the more important of the new extensions should be of interest:

### Main Island, Eastern Territory

**Boso and Hojo Lines.**—Three new railway extensions in the eastern peninsula bounding Tokyo Bay as undertaken under the designation of the Boso Line are designed to serve the intensively-cultivated and densely-populated alluvial plain east of Tokyo, a region which is rich in agricultural and marine products. Farther south, an extension designated the Hojo Line has been built as far as the southern extremity of the peninsula. This line involved the boring of seven tunnels, including the Nokogiriyama tunnel, 4,106 ft. in length on the provincial border between Kazusa and Awa provinces.

**Gan-Etsu Line (Koriyama-Niitsu).**—Through the greater part of its length of 58 m. 58ch. this line, which is the western extension of the Taira Line, follows the valley of the river Akano, which cleaves its course through the lofty ridges that divide the province of Iwashiro from Echigo. In order to lead the line up the sidehills of this wall-sided narrow gorge on a 1-in-88 grade with a minimum curve of 15ch. radius, it was necessary to use tunnels at frequent intervals, and support the line on high viaducts at numerous places. Altogether 32 tunnels, aggregating 34,574 ft. in length, were bored, and 99 bridges with a total length of 13,287 feet were built over the river. The rapids of the river Akano, to be particular, had to be crossed at five places by bridges of long spans and

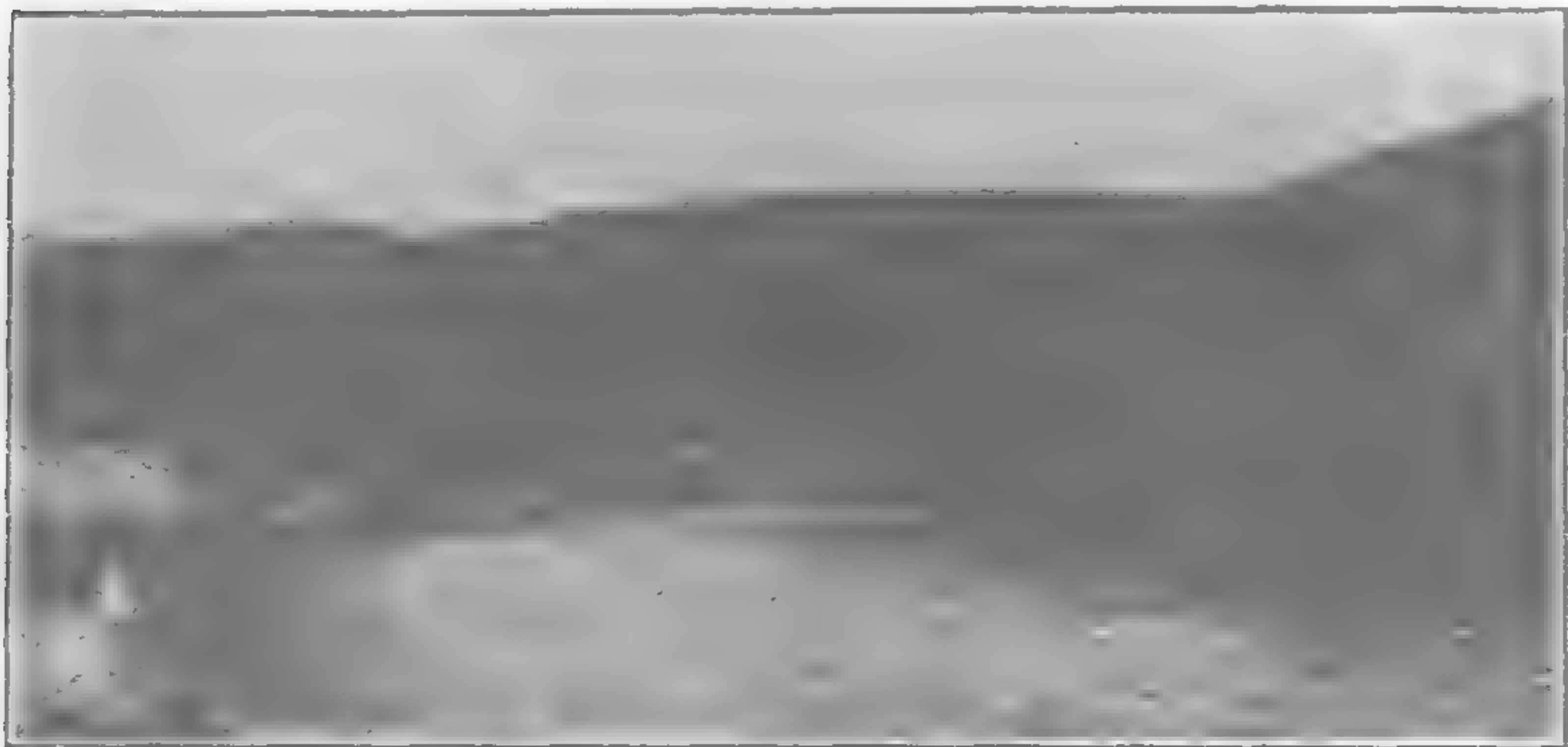


Near Omaki Bridge

on the seaboard of the Japan Sea. Of other projects in the Main Island may be mentioned the Toyama Line which skirts the rugged Japan Sea coast in Middle Japan, and the Taira and the Gan-Etsu Line, which, linking up the two



high piers on account of the high flood mark of the river, and, at three places where it was found impossible to provide



No. 1 Bridge over the Kiso, Central Line

footings and false bridges in the rapids, the line was carried on a bridge of cantilever structure, which was an engineering novelty in Japan at that time. The boring of the Hirase tunnel, 6,581 ft. in. length, was one of the hardest tasks on this line, the work taking full three years as a result of being hampered by the eruption of veins of water.

may be recorded as one of the triumphs of Japanese engineering.

*Taira Line (Taira-Koriyama).*—This 54-mile line runs partly through broken country with the ruling gradient of 1 in 50 and the sharpest curve of 15ch. radius. One of the engineering features of the line was the bridging of the river Abukuma. The bridge has ten spans of 40ft., seven spans of 60ft., and two spans of 150ft., the aggregate length being 1,218ft.

*Shinjo Line (Kogota-Shinjo-Sakata).*—The Shinjo Line starts from Kogota, a station on the North-Eastern Line north of Sendai, and leads west to Shinjo on the O-U Line, and thence heads westward and terminates at Sakata, one of the few habitable ports on the Japan Sea coast. The section of 5 miles that is laid through the gorges watered by the river Mogami was one of the greatest engineering difficulties and involved the boring of no less than nine tunnels, three of which exceed 2,000-ft. each. More than two years of laborious work were required to complete this short section. Another engineering feature was the bridging of the river Mogami, which the line crosses at two places. No. 1 Bridge measures 1,426-ft. and consists of four spans of 200-ft. and nine spans of 60-ft.; No. 2 Bridge is 2,701-ft. long and consists of twenty-two spans of 60-ft. and six spans of 200-ft.

Scarcely less difficult was the section following the valley of the river Arao, which required the boring of two tunnels, 3,486-ft. and 2,923-ft. long respectively. The sudden exhalation of sulphuretted hydrogen, which took place in the excavation of the latter tunnel, obliged the engineers to give up the work, and to relocate part of the alignment in order to avoid the sphere affected by the poisonous gas. The new alignment, passing along the cliffy valley of a mountain stream, involved a great deal of cutting, embanking and tunnelling work. In order to furnish protection against the onrush of the river Otani, there were provided high retaining walls at two places—one, 48-ft. high and 328-ft.

long, being built entirely with concrete work and the other, 35-ft. high and 228-ft. long, built of pitching stones.



Kamanowaki Bridge, on the Ganetsu Line

*Shibata Line (Niitsu-Shibata).*—This 16m. 46ch. line is an extension of the Gan-Etsu Line. The lower reach of the river Akano is crossed, on this line, by a bridge 4,077 ft. in length consisting of four spans of 200 ft., ten spans of 70 feet, and fifty-six spans of 40 feet. Considerable difficulty was encountered in the construction of this bridge, particularly in the work of piling and the provision of scaffolding, on account of the weak strata of the river bed, combined with the depth of the water, the maximum of which was more than 16 ft. The work was further hampered by the flood which occurred in the thaw season. Under the circumstances it was deemed necessary to expedite the laying of girders, and to that end each span of 200 ft. was erected in two days and a half on an average, and the remaining ten of 70 ft. and fifty-six of 40 ft. girders were finished at the rate of 7 spans per day. The completion of the work in so short a space of time



Double Bridge at Tenryugawa

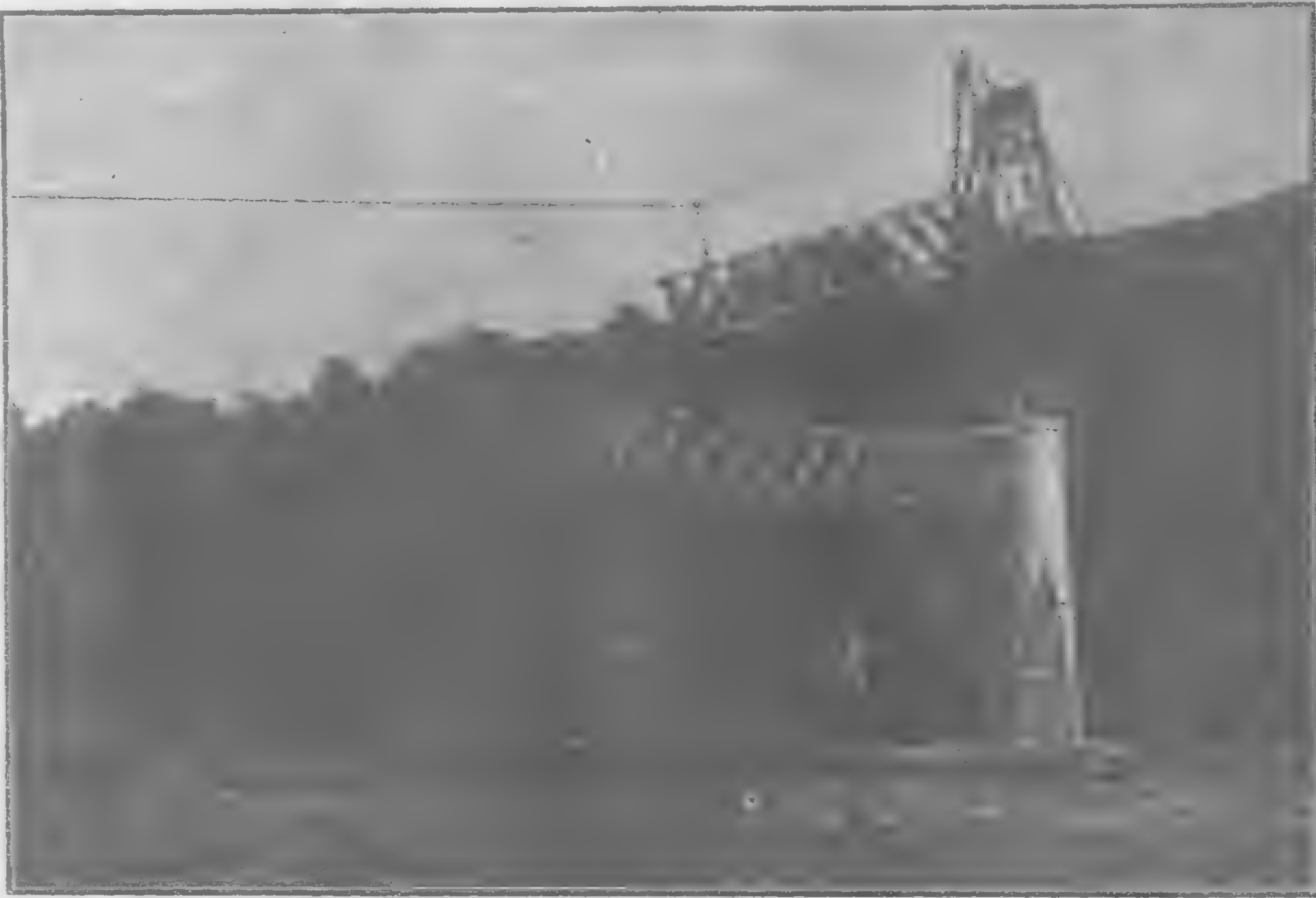


## Main Island, Middle Territory

*Central Line (Tokyo-Nagoya).*—This line, going westward from Hachioji, north of Tokyo, passes through the craggy and lofty range of mountains which separates the two provinces, Musashi and Kai. In order to use the maximum grade of 1 in 40 with the sharpest curve of 15ch. radius, it was necessary to drive on a section of 53 miles 42 tunnels, with an aggregate length of 62,745-ft., including Kobotoke (3,350-ft.) and Sasago (15,279-ft.). The excavation of these two tunnels, especially the latter, was a very toilsome proceeding, not only because the rock to be drilled was hard, but also on account of the presence of underground water veins.

What made the work on Sasago tunnel particularly difficult to handle was the fact that the western entrance of the tunnel was located on the cliffy bank of a river, impossible of access, and the start therefore had to be made at a point 4 chains off. From the eastern side a drift of 170-ft. was driven to the line of centre of the tun-

After passing the summit of Mt. Torii by a tunnel of 1m. 3ch. the line follows the narrow valley of the river Kiso, hemmed in by the chain of overhanging ridges, which it crosses at two places. No. 1 bridge over the river



Bridging over the Taëma River, Ganetsu Line



No. 2 Bridge over the Kiso, Central Line

Kiso consists of one span of 300-ft. and two spans of 80-ft., and No. 2, one span of 300-ft. and two spans of 60-ft.

*Toyama Line (Toyama-Naoetsu).*—From Ichiburi eastward to Omi, a distance of 8½ miles, the alignment of this line pursues its tortuous course keeping on to the craggy termination of the northern range of the "Japan Alps," as it descends abruptly into the Japan Sea,—a route which was proverbially regarded as impassable even for pedestrians except at the peril of their own lives. Tunnelling, grading, and cutting works were exceptionally heavy on this section, involving 9 tunnels aggregating 19,195-ft., including three between 3,000-ft. and 5,000-ft. The boring of the tunnel of Koshiraza, 4,956-ft. in length, took no less than 1,000 days, the excavation requiring 49,900-lb. of dynamite to explode the hard, rocky strata.

nel to push on the work toward both sides. The hydraulic power of the two rivers which run near both entrances was utilized for the supply of electric current for operating the air compressors and for lighting purposes. Farther on the peaks of the ridges of mountains which separate the province of Kai from Shinano are passed by the use of no less than eight tunnels aggregating 6,314-ft. on a section of 46 miles together with an embankment which reached more than 90ft. high at several places.



Arakawa Bridge, Shibata Line





Viaduct at Amarube

### Main Island, Western Territory

*San-in Line (Kyoto-Nima).*—The Wadayama-Kasumi section of this line, has acquired engineering notoriety, on account of the arduous task involved in filling in the pond of Momoshima, through which the alignment was made to run for a matter of 12 chains. The ground subsided as soon as it was filled in, and part of it slipped and swelled out above the surface of the pond, the piles set up for retaining purposes in consequence collapsing under the lateral pressure of the earth. Altogether over 900 days were spent on the work, the amount of earth required for the purpose of infilling reaching the colossal figure of more than 160,000 cub. yards. Originally part of the Japan Sea, the pond was presumably cut off by the delta formed in the estuary of the river Maruyama, as was confirmed by geological survey, which revealed the existence of a layer of mud over 90-ft. thick and, beneath it, a layer of mixed sand and shells two or three feet thick above the rocky stratum dipping sharply towards the river. This configuration of the ground undoubtedly caused the earth, as originally cast in, to subside through the muddy layer, and then to stray away from under the bottom of the pond.

The boring of the Ashiya tunnel, 6,029-ft. in length, was another tough piece of work on this section. The excavation was in a mixture of granite and trap rock for the eastern side and clay-slate for the western side. The work was facilitated by the use of shafts, which were provided at five places for boring and ventilating purposes. Farther on this section contains a range of mountains, the sidehills of which fall sharply to the sea, and so it was necessary to carry the line through it by the frequent use of tunnels which aggregated 16,800-ft. in total length, while at other places the line had to be supported on an embankment 30-ft. to 40-ft. high. The Kasumi-Tottori section zigzags along the narrow valleys

through the ridges which jut out into the sea at several places. It involved heavy tunnelling, bridging, gradient and earthwork, particularly where the line was supported on an embankment at an altitude of more than 100-ft. One of the engineering features of this section was the Momomi tunnel and the viaduct at Amarube. The Momomi tunnel, 6,040-ft. in length, required four years of unremitting labor and an outlay of Y.600,000. The work was hampered by the eruption of veins of water, which, with

the progress of the work, increased to 500 gallons per minute, baffling electric pumping for a time.

The trestle-work viaduct at Amarube was an engineering novelty in Japan at that time and was built on the plan formulated on the advice of Mr. Pual L. Wolfel, an expert in this line of engineering at Philadelphia. It is 1,019 ft. long and 136 ft. high, and consists of 11 steel trestles superimposed by plate-girders of 30 feet and 60 feet laid alternately.

The westward extension of the San-in Line as far as Masuda is now well forward. The alignment generally skirts the rugged coast of the Japan Sea, passing through broken chains of narrow and deep valleys, entailing heavy tunnelling and embanking work. Sixteen tunnels over 300 ft. long were driven, including Yunotsu, 3,707 ft., Nagasawa, 2,574 ft., No. 1 Asari, 1,650 ft., and No. 2 Asari 1,230 ft. Farther west, the line is designed to bifurcate at Masuda, one branch running westward as far as Hagi, and the other turning south and leading to Yamaguchi, the terminus of an 8-mile branch to the San-yo Main Line. This extension which passes through the axial range of West Japan is one of the most difficult lines involving heavy rock and



Shore Protection, on the Saeki Line, Kyushu



tunnelling work, including a tunnel of 6,223-ft. driven through the precipitous pass of Tashiro together with many others of more or less length.



A Tunnel on Sendai Line, Kyushu

#### Island of Shikoku

Of the four component islands of Japan Proper, Shikoku is the most scantily provided with railway facilities, the



Approaches to the Takaya Tunnel

lines being at present confined to the northeastern coast and to the valley of the river Yoshino in the eastern part of the island. There are now two railway projects contemplated in the island—one being the extension of the existing Takamatsu-Kawanoe Line westward to Matsuyama, a town of local importance on the north coast, the other being designed to connect Kotohira, the terminus of the branch to the Tadotsu Line, with Awakeda, the western terminus of the existing Tokushima Line, and then to lead the extension to the south coast of the island in order to give commercial outlet to this part of the island, most inaccessible at present, though rich in marine products and natural resources.

#### Island of Kyushu

*Kagoshima Line.*—The extension, going northward from Kagoshima, heads through rugged country maintaining the maximum gradient of 1 in 40, with the sharpest curve of 13ch. radius. This was effected by the use of numerous tunnels and by means of a switchback on the spiral system giving an ascent of 1.25 miles for a difference in altitude of 127-ft. at the point of crossing.

Farther north it keeps close to the steep and craggy hillsides of the range of mountains beetling over the rapids of the river Kuma. Twenty-three tunnels have been bored in a distance of 33 miles to carry the line through this broken tract on a maximum gradient of 1 in 100 with a minimum curve of 13ch. radius. The rapids of the Kuma are crossed three times by bridges of long arches and high piers, necessitated by the deep ravines and the high flood mark which exceeded 20-ft. in one case. At several places the line is supported on viaducts built over the deep ravines. The ridge of Mt. Yadake, which separates the provinces of Higo, and Hiogo, had to be perforated by a tunnel of 1m. 24ch., the



No. 1 Bridge over the Moyami, Shinjo Line

longest on the line. The excavation was largely in hard rock, and the trouble was further aggravated by the eruption of veins of water and by the fact that the heavy gradient of 1 in 40 had to be designed for the track in the tunnel. The embankments reached as high as 115-ft. at one place.

*Oita Line (Yanagigaura-Oita).*—On this 40-mile line which exploits the north-eastern part of Kyushu, tunnelling and cutting work were rather heavy, as it has largely to keep to the foothills of the mountain range, which drops abruptly into the Bay of Beppu, leaving a narrow strip of land.

The cliffs had to be terraced for construction at several places by cutting the edges of the sidehills or by infilling work along the shore. The line makes as many turns and bends as are allowed by the radius of the minimum curve of 15ch. radius, and where it is no longer possible to maintain this curvature, the line is supported by a shore protection wall, 25-ft. high, for a distance of 55ch. An immense amount of cutting and tunnelling work was involved.



**Saeki Line.**—This 41-mile line connects Oita with Saeki on the eastern coast of the island of Kyushu, the ruling gradient being 1 in 66 and the sharpest curve of 18ch. radius. The southern portion of the line makes a tortuous course, as it has to traverse a mountainous district with numerous ravines and gorges, there being 27 tunnels aggregating 30,120-ft. in length. The Sashu tunnel, 4,669.5-ft., proved the most arduous undertaking, as the entire strata were composed of hard crystalline schists intermixed with loose layers and fragile splinters at places, which collapsed more than once in the course of boring. The boring of the Tokura tunnel, 5,253-ft., and the longest on the line, was also rendered extremely difficult by the presence of hard rocks, and which, with intervening beds of clayey rocks interspersed with loose layers, exposed the laborers to constant peril of collapse.

**Miyazaki Line.**—One of the most difficult engineering projects carried out in Japan under the new régime was the construction of the Miyazaki Line, 69m. 50ch. This line diverges at Yoshimatsu, from the Kagoshima Main Line and reaches Miyazaki, a local centre of commerce on the eastern coast of the island. The line generally runs through an entangled mass of foothills and ravines of the lofty range of Kirishima. Particularly on a 31-mile section, east of Miyakenojo, where the ruling gradient of 1 in 60 and the sharpest curve of 15ch. radius were secured, it was necessary to drive seven tunnels of over 550-ft. each, including Aoidake tunnel, 5,016-ft. or about one mile.

The excavation of this tunnel was largely in weak serpentine rock, which, as the excavation proceeded, gave place to clay-slate reduced to a friable condition by the action of the air. In consequence, the cave contracted and crushed in under the pressure of the earth, damaging the system of timbering seriously. A vertical shaft of 150-ft. was sunk in order to expedite the work, and the driving of the heading required no less than 669 days—an average rate of 7.5-ft.

per working day. The second longest tunnel was Inotani No. 4, 1,933-ft., through a mixture of black clay-slate rock and volcanic ash, of a fragile and most treacherous nature. Its cohesion was soon destroyed by the contact of the air, and this caused the bricking to crack under the heavy pressure of the earth.



A Tunnel on the Hojo Line, near Tokyo

### Island of Hokkaido

The Construction of Hokkaido Railways Law promulgated in 1896 laid the foundation of railway work in the island of Hokkaido. This law provided for a new construction of 562 miles. The new construction in the island for the ten-year period following the nationalization amounted to 356 miles. One striking feature about the railway construction in Hokkaido is that the lines are largely of a colonial nature and have been built expeditiously and with the greatest possible economy in the plans, so that they present but few engineering feats worthy of special mention.

**Kushiro (Ochiai-Obihiro) Line.**—The 17-mile section between Ochiai and Shintoku was one of the greatest engineering difficulties. Here the line is carried over the rugged, elevated borders between the two provinces, Ishikari and Tokachi, the peak of the range, 1,760-ft. above the sea-level, being pierced by a tunnel of over 3,000-ft., in order to maintain the maximum grade of 1 in 40 and the minimum curve of 9ch. radius. The region is under snow and ice for the greater part of the year and is marked by very rigorous weather throughout. Four years and a half were spent in the boring of the tunnel, work being seriously hampered by the rock formation combined with the effusion of water, so that it was impossible to carry out excavation at any greater rate than 3-ft. a day. There had also to be provided at an altitude of 1,758 feet above the sea-level an embankment 150-ft. high for a distance of 10 chains.

**Abashiri (Ikeda-Abashiri) Line.**—The line traverses rolling country, which is very rough at places, particularly on the border between the two provinces, Kushiro and Kitami, where the line zigzags along a narrow and rugged valley on a gradient of 1 in 50, until it reaches a point 1,290-ft. above the sea-level. Tunnelling work was heavy, and



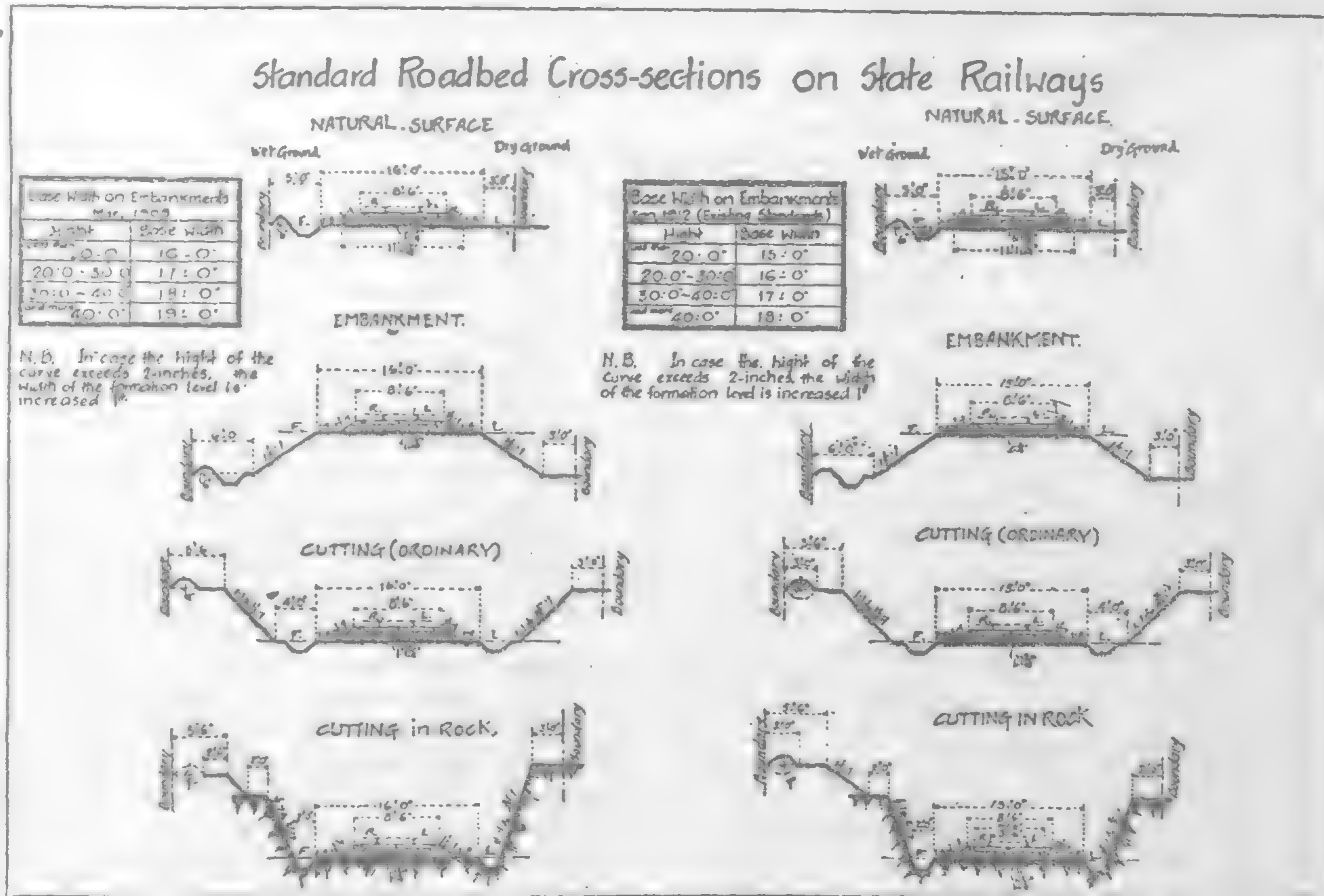
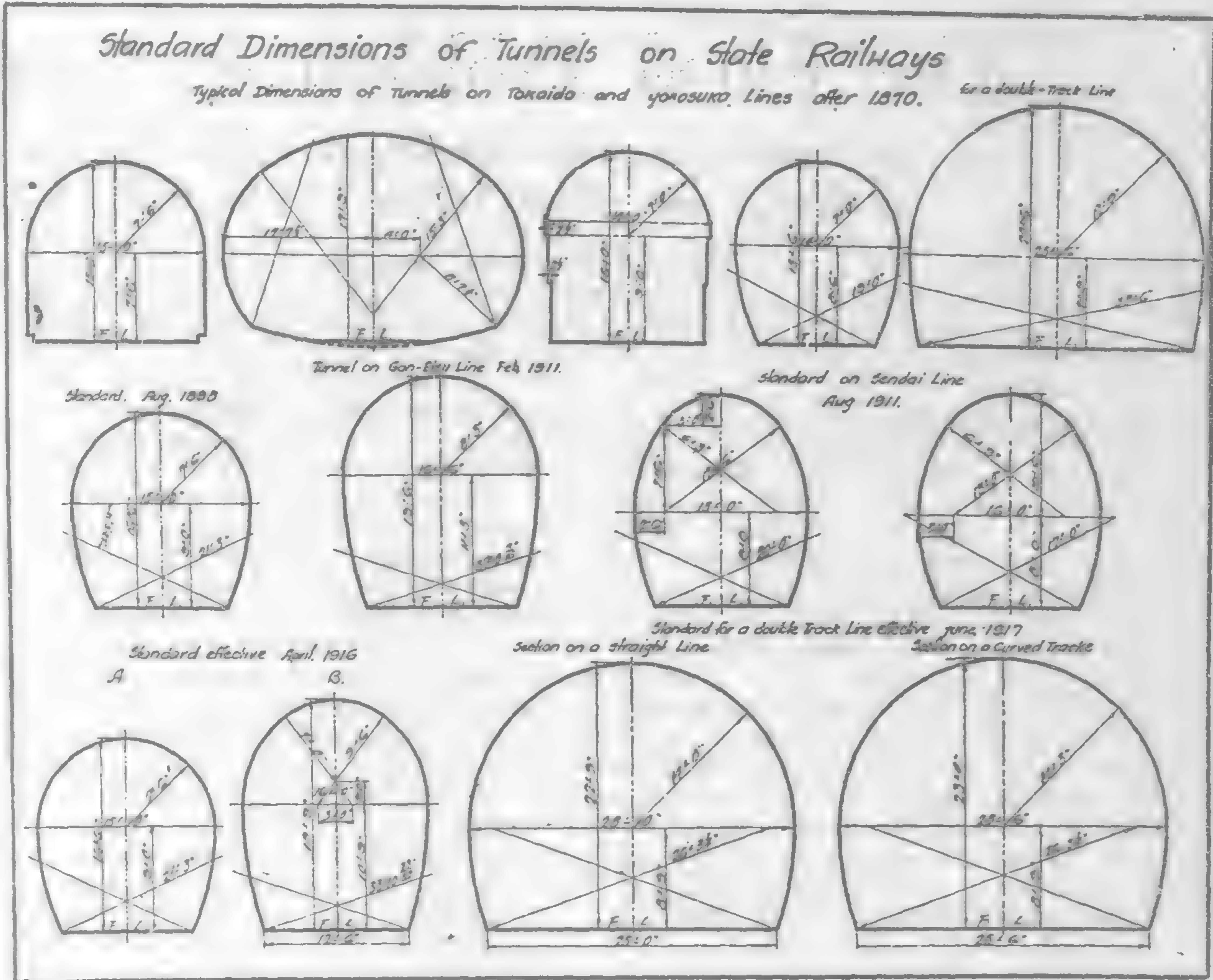
Protection Work of Takaya Tunnel Approach



serious difficulty was encountered in excavation, owing to the weak and treacherous nature of the strata, which demanded a solid system of timbering.

**Shimofurano (Taki-gawa - Shimofurano) Line.**—This line of 35m. 63ch. which forms a direct and shorter link between the Hakodate and the Kushiro Lines run in a southeasterly direction along the narrow, cliffy bank of the river Sorachi, a tributary to the Ishikari. The country traversed by the line, is exceedingly rugged, heavy earth-work being required to carry the line over the deep ravines of the river at several places. The bridges built on this section are mostly high, the formation level of the line reaching, in one case, 80-ft. above the river bed, with the embankment 50-ft. high. The boring of Yunoshita tunnel was another engineering difficulty. The tunnel goes through the cliffs washed by the rapids of the river Sorachi, and the shore had to be protected with concrete or pitching fences against the collapse of the mountain slopes. Then the wash of the current was guarded against by means of rubble mounds strengthened by huge superimposed concrete masses.

**Soya Line (Asahi-gawa - Wakkanai).**—The range of mountains which separates the province of Teshio from Kitami is passed by a tunnel of 1,233-ft. in length, the boring of which was seriously impeded by the prevalence of loose strata and the heavy pressure of the earth, coupled with the difficulty in conveying brick and cement, owing to the absence of any available road.



**Nemuro Line (Kushiro-Nemuro).**—Another 90-mile trunk line now in progress in the Hokkaido is the Nemuro Line, an extension of the existing Kushiro Line.



# The Flood Problem at Canton

An Expenditure of \$35,000,000 will, in the Opinion of  
an Expert, Solve Flood Troubles in the Canton Delta

THE preparation of data in connection with the scheme of conservancy to secure and maintain proper control of flood waters within the West, North and Canton River basins continues, and Report No. III of this series, has now been issued by the Board of Conservancy Works of Kwangtung, of which Mr. Tsao Yu-ying is the Director-General. Report No. III is on the North River System, and is by Captain G. W. Olivecrona, the Engineer-in-chief of the Board, who makes an appeal for action without delay since attention to the North River constitutes the first stage of work which will ameliorate the deplorable flood conditions prevailing throughout the Delta, though the conclusive effect upon the floods may not be expected before the proposed improvements of the West River are also completed.

To carry out the works on the North River deemed necessary by Captain Olivecrona, some \$10,900,000 (Hongkong currency) will have to be spent over a period of about eight years, while to control effectively the West, North and East Rivers a sum of \$35,000,000 (Hongkong currency) is estimated as necessary, one million in excess of the estimates of 1915. Of this total amount \$19,500,000 would be spent on the West River, \$10,900,000 on the North River, and \$4,600,000 approximately on the East River.

The means needed to control the floods in the North River are, broadly speaking, of the same nature as those proposed for the West River, with the addition of control sluices in some of the North River outlets with the view to abolish the dykes along those channels. This measure was not needed in the West River, where the total floods are proposed to be confined within the dykes in the main river.

The investigations now completed have led Captain Olivecrona to the following conclusions:

Protection against inundation from floods passing down the North River cannot be sought by lowering the flood level, but can be obtained by confining the floods within the limit of the present and some new constructed dyke systems in definite channels, and by a system of control sluices and flood-gates. For the success of the scheme it is required that the dykes be partly reconstructed, generally improved and fully maintained to a proper elevation.

The need of a speedy solution of the Kwangtung flood problem becomes manifest for every year that passes, the dyke systems gradually getting weaker and showing now a less resistance against floods than they did when the Board began its investigations over four years ago. An ordinary summer flood as that of 1918, which may occur in any year, is already dangerous to the dykes, and will become more so, as the dykes lack upkeep.

Although the need for flood control in the West River is as pressing as that in the North River, Captain Olivecrona is nevertheless of the opinion that the latter should be attended to first of all for the reasons that the North River floods threaten highly cultivated and densely populated regions with large commercial and administrative centres as Canton, Fatshan, Chanchuen, etc.; by using a relatively small amount of money, an effective flood control, immediately perceivable, would be inaugurated at the beginning of the execution of the scheme; supervision of the works, and safeguarding against interference from outside influences would be easier originated near the centre of administration, than the far

away districts of the West River, and the population in and around Canton, being closely concerned in the regulation, are more likely to grasp the advantage of introducing modern flood control than the natives living in more distant districts. Introduced in one place, the modern appliances would readily be accepted in others.

According to available maps the total area of the region over which the water is spread out in case of inundation from the North and West Rivers is 10,550 sq. km., or 12,340,000 *mow*. Of this about 3,100 sq. km. represents mountains and rivers, and 7,450 sq. km. land, cultivated or fit for cultivation. Considering 75 per cent. of the last mentioned is being cultivated at present, we arrive at the figure 5,587 sq. km., or 6,536,800 *mow*, as representing the area on which the crops run the risk of being destroyed, should a heavy flood occur. This area does not include the region subject to inundation from the East River floods. The cost of eliminating this danger would amount to, in round figures, \$4.60 per *mow* of cultivated land. Considering that one rice-crop represents a value of \$25 to \$30 per *mow*, a cost for necessary protection works of \$4.60 is insignificant.

Captain Olivecrona estimates the time for completion of the West and North River schemes at fifteen years, during which time consequently the farmers should have to pay 30 cents per year and *mow* for flood protection works. Keeping in mind the losses inflicted by one single flood, as for instance that of 1915, when, according to a very moderate estimation, values of up to *ten million dollars* were destroyed, the population would, no doubt, take upon themselves the responsibility of paying a tax, provided guarantees were given, that the tax would be efficiently and well spent for the purpose intended.

## The North River Problem

The North River, or Pei-kiang, is the second in size as to length and discharge, of the three main rivers of consequence draining the Kwangtung province, the West River ranking as the first and the East River as the third. It rises in the northern part of the province having its source on the southern slopes of the Meiling range, which latter separates the Kwangtung and Kiangsi provinces. The river flows at the beginning in a south-westerly direction which it keeps to Shiuchow, a distance of about 150 km. On Chinese maps this section of the river is called Tsengshui. At this point it makes an abrupt bend to the South and continues to run in that direction for some 250 km., where the Samshui Bend changes the direction to a south-easterly one.

Here the river enters the Canton Delta built up by the joint action of the three main Kwangtung rivers. The hydrographic aspect of the delta is very confusing, the channels forming a labyrinth of waterways in which it is difficult to follow the course of the special rivers, and to state the part each river takes in feeding the channel system.

The total length of the North River, measured from available maps, from its source to the sea along the Tamchow Channel amounts to 500 km. (740 Chinese *li*).

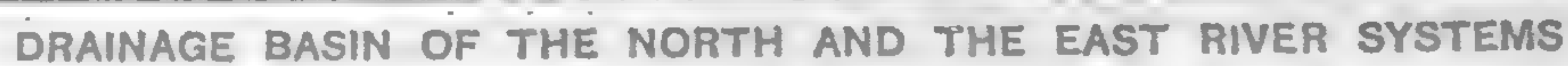
From Namyung, a city situated about 40 km. from the source, the river is navigable for small river craft not exceeding 0.90 m. draft the whole year round, though rapids and frequently shifting sandbanks make navigation even for boats of that draft difficult.



duration. The following are the largest tributaries, named as they in turn debouch into the main river, beginning from its source.

The lower course of the North River or the part of it below the Felai Gorge is through several channels connected with the West River and the Canton River systems. During certain stages of the water both the North and the West Rivers contribute to the Canton River system and through that to the sea. The North River water goes into the West River and vice versa.

Above the Felai Gorge the river passes through a mountainous country. Several mountain ranges crossing the course of the river have been broken through, giving place to narrow





gorges confining the river within their steep walls which at flood times become rapids, dangerous to navigate. Between the gorges the river flows through a country of foot hills, many of which are cut out in fantastic shapes, giving to the country an aspect of unique grandeur. Limestone is here dominant and coal, together with other mineral deposits, occurs frequently. The valley sometimes widens into undulating land where cultivation is carried on with advantage during the low-water season. The hill-slopes are covered with grass and brushwood and scattered over with thin forests of pine and leafy trees. A reckless deforestation is at present going on, this not being confined to the trees only but also destroying the brushwood and even the grasscover.

The depth measured at its lower end was 4 m. at low-water and 14 m. at high-water. The narrowest part at low-water was 130 m.

The gorges control the discharge above, each in its place and form insurmountable obstacles which make fruitless any attempt to lower the high-water level by extending the cross-section. No dyke systems of consequence are met with along the main river above the Felai Gorge, the shores generally ascending in a steep gradient from the river-bed.

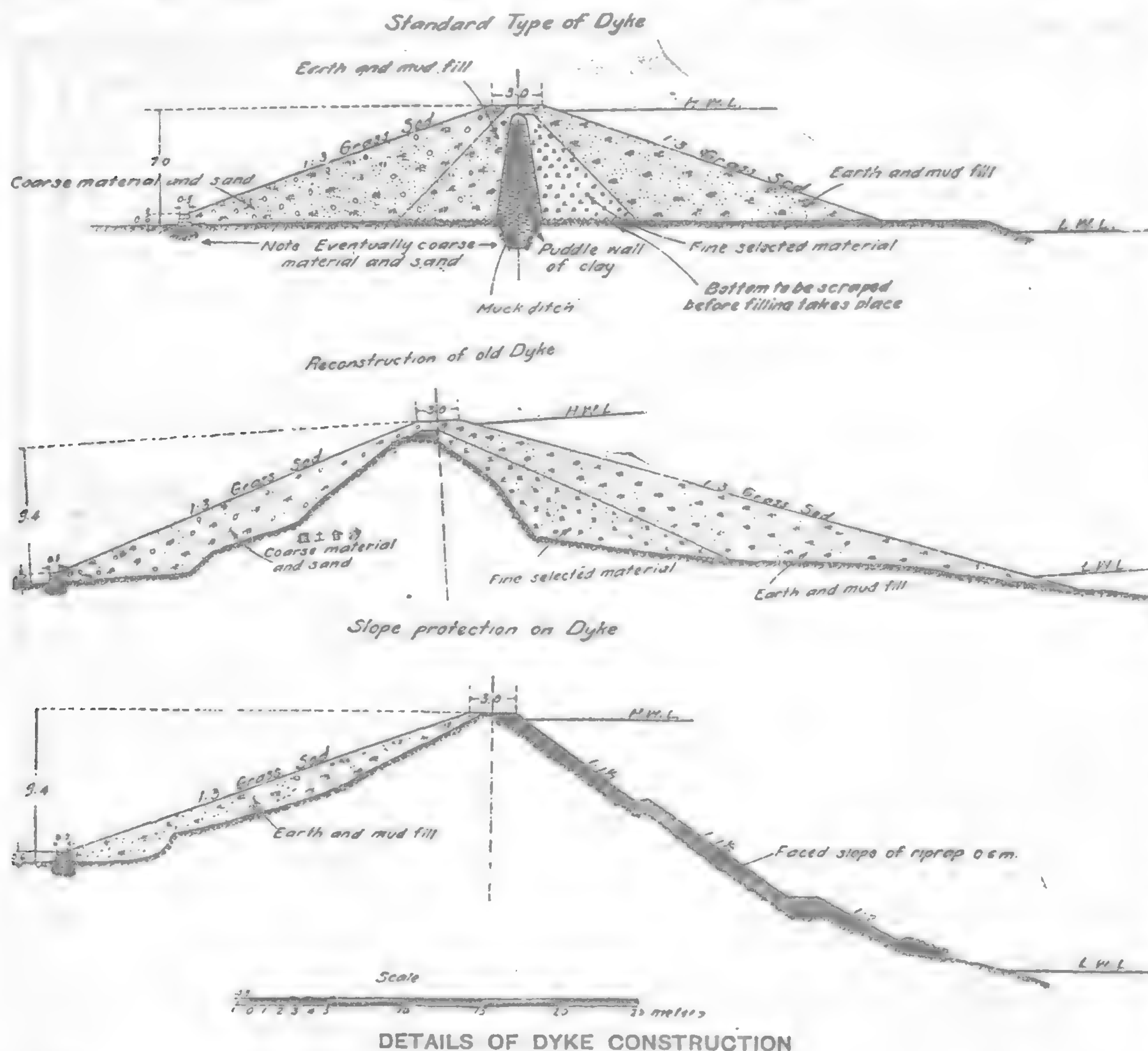
No survey in detail has so far been made above the Felai Gorge, but below it the investigation has been completed and a closer description of the river-bed in that part can therefore be given.

Passing the Felai Gorge the river has left the mountainous region and, speaking generally, has reached the plains. The shores below the Gorge are protected by dykes, and continue to be so with a few exceptions down to the mouths. The slope of the plane from the Felai Gorge down to Tai-chow averages 1 in 12,000.

The dyke systems along the river are in some places of a substantial construction and well maintained, in other places of insufficient strength and in a state of dilapidation. To the first category may be assigned the dykes on the left side between Shekkok and Samshui, to the latter those above Shekkok on both sides of the river. Here, however, as well as along the West River the dykes are characterized by their lack of homogeneity in construction, a dyke having been found for a long distance without fault suddenly

showing a weak spot, which neutralizes the effectiveness of the whole system. These irregularities are prominent below Samshui and especially in the dyke systems bordering the many creeks and channels branching out from the main river. As the conditions now are these inland dykes necessarily must be constructed and maintained to the same strength and height as the main dykes along the river proper. A closing of the channels during flood times would naturally remove the strain from these dykes, and considerably lessen the cost of their maintenance.

In the lower delta dykes are often constructed in double lines, the one nearest the river being of latest date. The riparian owners have thus illegally encroached upon the original high-water section to the detriment of a speedy run-off of the floods. Furthermore, the shore outside the dykes, being without exception planted with mulberry trees that cause a slackening of the current followed by settling of sedi-



The river-bed is filled with sandbanks between which the channel meanders, forming the usual concaves and convexes, characteristic of rivers, with shallow crossings of only a meter in depth or even less at low-water. The deposits seem to consist of a heavier material than that found in the West River valley.

Immediately above the junction of the Linchow-kiang the North River passes through the Mongtze Gorge, this having a length of 4 km. and a width at its narrowest part of only 100 m. The average depth is 9 m. at low-water but this increases to 27 m., at high-water.

Another break through is found 20 km. below the Linchow River at Lianglu Hap, formed by protruding rocks, but this is of inconsiderable length.

The largest of the gorges is the Felai, situated 16 km. above the city of Tsingyun. It has a length of 9 km. and is bordered by mountains reaching a height of 500 to 600 m.



ment, grows in height and adds to the encroachment upon the section.

### Means for Regulating the Floods

The floods in the North River are caused by heavy rainfall in the upper part of the drainage basin, beginning at the end of March, intensified by the summer typhoons and ceasing to be dangerous in the beginning of September. During this time the water in the upper course rises and falls with great rapidity, but is in the lower course kept at a high elevation during long periods.

The dykes, constructed along the river banks to prevent flooding of the adjacent low-lying land, are at present neither high enough nor of sufficient strength and homogeneity to keep out the water, and are subject to overtopping or undermining when extreme floods occur. The heaviest flood recorded appeared in 1915 when the water rose to a height of 1.2 m. above the dykes in the Tsingyun region. The dykes further down at Suikongkai, Lupao, and other places gave way and the waters flooded the plains to the East, laying Canton and Fatshan under water. As long as the Lupao and Sainam Creeks are left open the yearly summer-floods will always inundate a part of the plains. In the year 1918 the flood level at Tsingyun stopped 1.5 m. below that of 1915, but still Canton was flooded for some time. These two channels are insufficiently dyked, but even if they were properly dyked nothing but closing them during high stages in the North River would save Canton and the surrounding country from inundation.

The means, which have been taken under consideration to be employed to regulate the run-off in a way that prevents inundation of the land, may be classified as follows: Afforestation; storage and retarding reservoirs; cut-offs and outlets; and confining the floods within embankments (dykes).

The excessive rainfall in the North River basin produces a maximum run-off of 15,500 cu.m. per second, a volume which consequently has to be conveyed to the sea, if inundation should be avoided. Reforestation as a means to lower the present maximum floods is not to be relied upon. Even if it should have some influence on the maximum flow, such effect would not be felt until after several tens of years. Reservoirs and retarding basins, if possible to construct, would only give a very slight relief from floods, and would in time lose their storing capacity on account of silting. Cut-offs and dredging of the river bottom, would not alone be effective to lower the floods to a level that would give permanent security against over-flow of the present dykes. The immediate need is a regulation scheme that provides for a speedy relief to the suffering regions, and which can be executed within a reasonable time.

In order to limit the length of main dykes to be maintained, Captain Olivecrona proposes to close all channels now branching off from the main river by control sluices or flood gates, only permitting so much water to escape into these channels as will not be dangerous to the surrounding land. The general principle may be expressed in the following words: Restricting the floods within stable limits by raising the dykes, concentrating the flow in a few main outlet channels, and preventing the water from entering the tributary channels during flood times.

The project here laid down deals entirely with the control of excessive floods, but does not enter upon any scheme to regulate the low-water channels.

### Estimates of Cost

In calculating the following cost Captain Olivecrona generally used from 10 to 20 per cent. higher unit price than is now paid locally for the same kind of work; but has presumed

ed that the proposed work should be carried out with greater thoroughness than is at present the custom when employing Chinese contractors.

The greatest cost comes in the heightening and strengthening of the dykes. The earth-work has been calculated from a great number of cross-sections taken of the dykes, from the Felai Gorge down to Taichow.

The cost of the control sluices are approximate pending estimates of the iron structure from abroad; for estimating the cost of the flood-gates, figures from actual constructions have been used as a basis.

The old, as well as the new, dykes should be constructed with a top width of 3.0 m. and with slopes of 1 vertical to 3 horizontal. The volume has everywhere been calculated with these figures in mind. When local conditions warrant, the slopes may be changed, though never to a steeper gradient than 1 vertical to 2 horizontal if the sectional area is maintained. Captain Olivecrona proposes to support the inner dyke toe by a small stone wall, which at the same time will serve as a boundary line, and prevent the toe from being tampered with by the farmers. The slopes should be sodded or turf clad, and the growth of reeds, brushwood or trees be absolutely prohibited on the dykes.

The following is a summary of estimates in Hongkong currency:—

1. Control sluices	...	...	...	...	...	\$850,000
2. Floodgates	...	...	...	...	...	\$705,000
Irrigation Pipes	...	...	...	...	...	173,550
						878,550
3. Cutting of canal at Lupao	...	...	...	...	...	677,000
4. Repairs of old dykes	...	...	...	...	3,172,400	
Construction of new dykes	...	...	...	...	1,565,100	
Demolition of old dykes	...	...	...	...	85,000	
Removing houses	...	...	...	...	150,000	
Protection of dyke slopes	...	...	...	...	60,000	
Cuttings in the riverbed	...	...	...	...	429,000	
Revetment walls	...	...	...	...	634,050	6,095,550
5. Closing junction channel	...	...	...	...	...	149,000
Total Cost of Works	...	...	...	...	...	\$8,650,100
Purchase of land occupied by new dykes	...	...	...	...	\$717,900	
Administration and supervision about 12 per cent. on cost	...	...	...	...	967,000	
Miscellaneous, and not provided for above, about 6.5 per cent. on cost	...	...	...	...	565,000	2,249,900
Grand Total Cost	...	...	...	...	...	\$10,900,000

The following estimated quantities indicate the amount of work to be executed:—

Repairing old dykes, earthfill	...	...	...	...	cu.m.	10,859,000
Construction of new dykes earthfill	...	...	...	...	" "	5,852,000
Cuttings, including canal, earth to be moved	...	...	...	...	" "	4,345,000
Revetment walls of stone	...	...	...	...	run.	337,800
Control sluices	...	...	...	...	pcs.	3
Floodgates	...	...	...	...	...	39
The total quantity of earth to be moved	...	...	...	...	cu.m.	21,006,000

Realizing that the financing of the scheme will meet with difficulties, and considering that funds may be appropriated only at irregular intervals causing perhaps a suspension of work during certain periods, Captain Olivecrona suggests that the work be done in stages. The first should be the construction of control sluices at Sainam, Lupao and Shahow, the completion of which will require a time of two consecutive dry seasons but is to a certain extent dependent upon the facilities with which the necessary iron structures can be obtained from abroad. The total cost is estimated at \$850,000.

The second stage should be the completion of all flood-gates and pipe sluices and repair of old sluices, which work should be extended over the third and fourth dry seasons and will amount to \$878,550.

The third stage should be the opening of the short cut at Laklow during the fifth dry season at a cost of \$677,000, the fourth stage comprising the carrying out of all earthwork



for raising and strengthening old dykes and the construction of new ones; the cuttings in the river bed and the revetment walls. This could naturally be undertaken at any previous period as funds become available; but under supposition that funds are not forthcoming before the first, second and third stages are completed, a period of three dry seasons, the sixth, seventh and eighth, has been allotted for these works. The cost has been estimated at \$6,095,550.

The fifth stage should be the closing of the Samshui Junction channel. This should be done as the last stage of work after everything is completed in the North River as

well as in the West River. The work can be done in one dry season and will amount to \$149,000.

### Necessity for Control of Funds

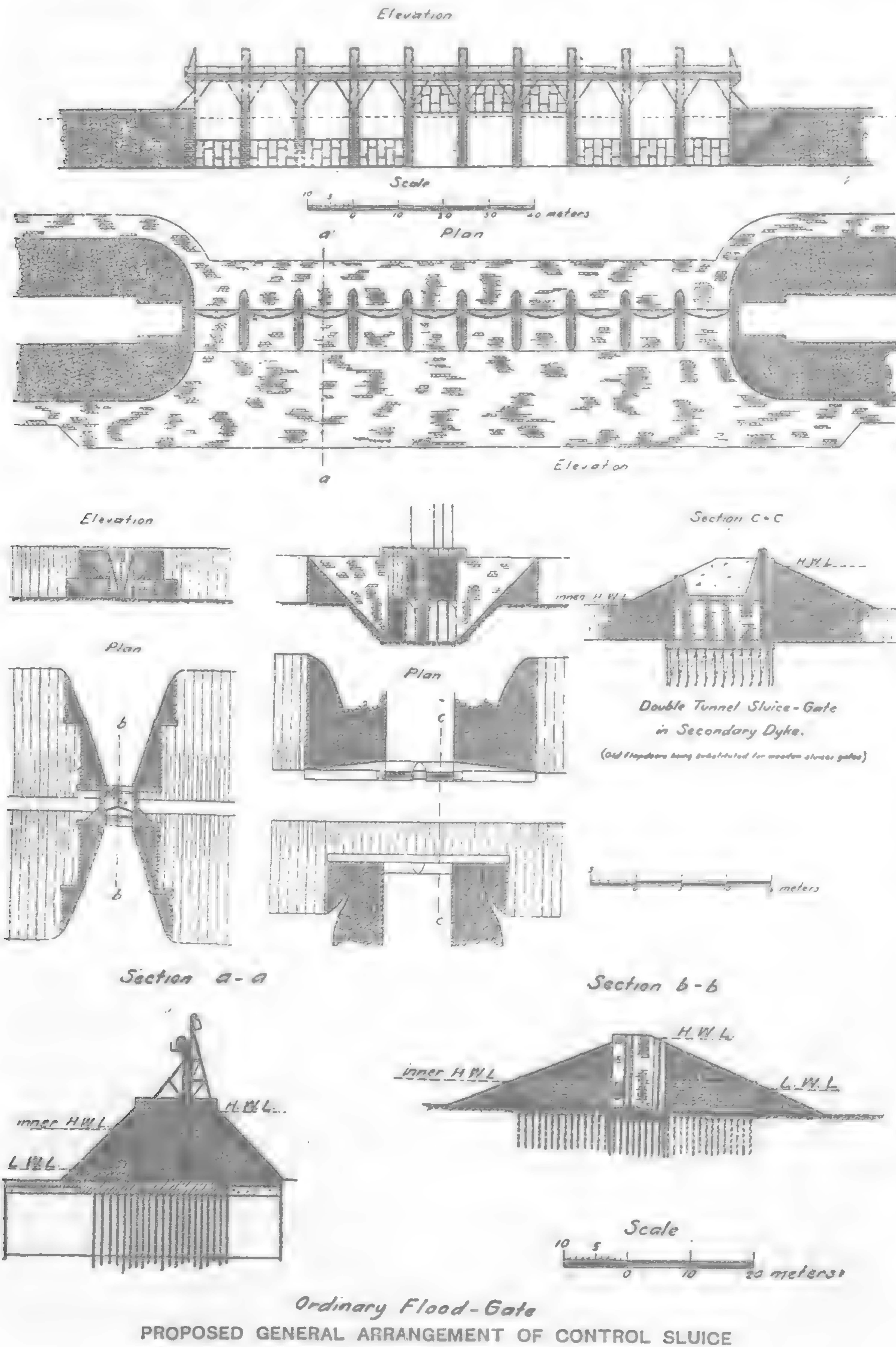
Works of such magnitude as are here proposed and which call for the appropriation of considerable funds for their execution, should from the beginning be put under rigorous control. Otherwise the money will be wasted and only an inferior grade of work will be obtained. Past experience has proved the present system of supervision, consisting of independent committees in charge of given

sections of dykes, to be far from satisfactory from the point of efficiency. Often these committees work at cross purposes for purely local gains, and much labor and money has in this way been lost. The rivers and the different conservancy works are dependent one upon another, and, therefore, their control should be directed from one central organization possessing technical and administrative qualifications to deal with the problems that may arise. Such organization does not exclude the participation of the people themselves in the work of bringing the flood problem to a satisfactory solution. The dyke committee as representatives of the people should still supervise all secondary dykes, but should leave the upkeep of the main dykes entirely in the hands of the central organization. The committees would be subject to the central organization, and in questions of expropriation of land, the removal of houses, levying of workman, etc., etc., their authority and their knowledge of local conditions would render valuable service to the central organization.

In accordance with the above-mentioned principles the sole management of all the main dykes with their control sluices, flood-gates and irrigation pipes should be in the hands of the Board of Conservancy Works, which, as already organized, is qualified to execute the proposed schemes, and to be responsible for the future maintenance of the dykes.

The Board should be invested with authority to:

- (a) Employ the funds that may be available for conservancy purposes according to approved plans;





- (b) Appropriate lands, houses, waterways and other property, private or common, that may be necessary for conservancy purposes;
- (c) Organize the works and to decide upon the order in which they shall be executed;
- (d) Command means of transportation from the Government's Transport fleet; and,
- (e) Requisition necessary numbers of the Government forces to be stationed at the working places, if needed, for the protection of the works.

It is the opinion of Captain Olivecrona that if these lines are followed, with such changes as time and the progress of the work may demand, the flood problem should, within the time proposed, be brought to a satisfactory solution.

## Concrete Pier at Lungkow

The development work which the Civil Governor of Shantung Province, General Chu Yin-kwang, is trying to push through draws attention to the efforts being made to establish a port at Lungkow. In previous issues we have given details of this



The Pier in Course of Construction

project, and also mentioned that in order to facilitate shipping a pier was under construction. That pier has now been completed, and we are able to give herewith some photographs of the work. The contract was signed in September, 1918, with Messrs. Andersen, Meyer & Co., and the whole work was completed within schedule time. The pier is built throughout of reinforced concrete and comprises an approach approximately 300-ft. long, while the actual pier extends 800-ft. from the shore line. It is approximately 30-ft. wide and consists of a heavy reinforced concrete deck resting on approximately 250 reinforced concrete piles varying in size from 12-in. by 12-in. by 40-ft. long to 14-in. by 14-in. by 50-ft. long. The driving of the piles was a diffi-



Laying the Reinforced Concrete Deck of the Pier

cult task, the subsoil proving extremely hard, while the handling of the piles was a delicate job since these weighed up to 10,000-lb. each and had to be carried by coolies from the establishment on



View under Deck of Completed Pier

shore where they were cast. The piles were driven by a steam hammer weighing approximately 3,000-lb., the pile driver and boiler being placed on a truck moving on rails on a timber scaffold. The whole work was handled by Messrs. Andersen, Meyer & Co.'s organization, and no subcontractors were employed.

At times up to 500 men were on the pay-roll, under the resident engineer, Mr. P. C. Pedersen, who was ably assisted by Mr. H. Ching and Mr. K. T. Yao. The work was designed and carried out under the charge of Mr. E. Park, B.Sc.C.E., head of the Concrete Construction Division of Andersen, Meyer & Co.



A View of the Completed Pier

The new wharf is connected with the old town of Lungkow, where goods from the interior are brought, by a light railway. Godowns have already been erected near the wharf for the storage of merchandise awaiting shipment. The wharf was officially opened for commercial use on January 4, the company announcing that it would waive wharfage fees for three months.

## Standardisation of Chains

The unprecedented demands of the Allied Governments for driving chains for all purposes during the period of the war, made it necessary for the British Driving Chain Manufacturers to collaborate in order to use the whole of their resources to the best advantage. As a result, the needs were met, both as regards quantity of production and quality of products. The benefits accruing from co-operation were so marked, that a permanent Association has now been formed. The main object of the Association is to foster and develop the use and application of chain gearing, the value of which is not yet fully appreciated by power users. In view of this, and in face of competition with other forms of transmission, it is the policy of the Association to keep down the cost of chain driving to the user.

This will be attained by: (1) Standardisation of chains, wheels and chain wheel cutters to ensure interchangeability. (2) Elimination of unnecessary sizes of chains, which have been a source of confusion and difficulty to the user. (3) The increase in output resulting from the above. (4) The more comprehensive research made possible by co-operation.

Further, it is confidently anticipated that the policy of the Association as set out above will enable British Driving Chain Manufacturers and their customers to secure a larger share of overseas business than hitherto. The Association is composed of Alfred Appleby Chain Co., Ltd., Tilton Road, Birmingham; Brampton Bros., Ltd., Oliver St. Works, Birmingham; "The Coventry" Chain Co., Ltd., Spon End Works, Coventry; Hans Renold, Ltd., Didsbury, Manchester.



# The Cancellation of Mongolian Independence

The voluntary cancellation of autonomy on the part of the Mongolian Government in November, 1919, and the far-reaching significance of this action direct public attention once more to this little known part of the Chinese Republic. From the point of view of China this decision of the Mongols cannot have been better timed; and if the Shantung award of the Paris Conference has been disappointing, the cancellation of Mongolian independence will in some measure salve the nation's wounded *amour propre*. On the other hand, the Mongols themselves will also be the gainers by the momentous decision, in view of the numerous intrigues and external machinations to draw them away from the fold of the Republic.

It was in 1911 that China's dependency declared its independence. The consensus of foreign opinion is, however, that the secession movement was never spontaneous but sprang from foreign instigation since the identity of the power interested was soon revealed in the series of agreements concluded in regard to the seceding dependency but primarily in favor of the instigating party. That being the case, the unnatural movement could not last long; at best it could not survive the political collapse of the power, Russia, which has exerted the compelling pressure all along—an assertion which is now borne out by present developments in Mongolia. The truth of this statement has, indeed, taken eight full years to manifest itself, but the testimony is none the less eloquent.

The Mongols are descended from the Hsiung Nu tribes, first known in the Han Dynasty (B.C. 206—A.D. 25). Since then they have played a not unimportant part in China's history. The outside world only knew of them when they overran Asia and Europe under their military genius and empire-builder Genghis Khan (A.D. 1162-1227), and at one time their dominion extended eastward to Korea, westward to Russia in Europe and southward to India. Their rise had been meteoric; so was their fall. There were no two or three Genghis Khans, and the huge empire soon fell to pieces. In China they were able to hold sway for only 88 years, and on the establishment of the Ming Dynasty (A.D. 1368-1644) they were driven back once more to Mongolia. During the next two centuries not much was heard of them, until the Manchus were invited into China Proper by an indiscreet soldier-statesman of the last Ming emperor. The rising power of the Manchus compelled respect and the princes first of Inner Mongolia and then of Outer Mongolia, swore allegiance and placed themselves and their tribes under Manchu protection. Thus most of the Mongol chieftains became vassals of the Tsing Dynasty of their own free will. Later, in the middle of the 18th century, through additional conquests, the entire region now constituting Mongolia was brought within the sway of the Manchu reigning house.

The system of administration is tribal in character. It is several centuries old and was left undisturbed even by the Manchus. The principal characteristic of the whole system is the "Ho-shun" or, in Chinese, "Banner." At the head of each Ho-shun is a "Jassak," who holds the Ho-shun practically as his own fief. His office is hereditary, and the succession of the new Jassak is confirmed by the President of the Republic. Even today the Jassaks retain the titles of "Ts'ing Wang," "Pei-leh," "Pei-tzu," and Kung," etc., conferred upon them by the Manchus. Or, a Jassak may be merely a first-class "T'ai-tse."

After the Ho-shuns, come the Aimaks. According to Colonel Baronoff's vocabulary of Mongol terms, an Aimak "is an ancient Mongol name for the fief which forms the inheritance of one princely family. Thus the Aimak is a collection of one or more principalities bound together by a common descent and historical past. Originally it was the possession of a single prince, their first ancestor. In course of time it became divided up into several independent principalities; nevertheless, the connection between the latter was not broken and the prince senior in the family is still considered the head of the Aimak." At present the Aimak, as an administrative organ, has sunk into historical insignifi-

cance, its power having been transferred to the League, so that the senior prince of each Aimak has now really no duty or authority as such.

The largest administrative unit is the league, a device said to have been originated by the Manchus. In Outer Mongolia the four leagues are made to coincide in composition with the four Aimaks, while in Inner Mongolia the twenty-four Aimaks are grouped into six leagues. The Jassaks of a league meet together in a council or Diet and elect a president for the league. This elective appointment is then confirmed by the Peking Government.

Besides meeting to elect a president, the Diet of the league also has other functions to perform: "All the Jassaks of the league meet together periodically to settle (1) judicial affairs in which persons of different Ho-shuns are interested, and (2) economic and administrative matters concerning the whole league and matters connected with the statistics of the league. The president of the league sees to the execution of the Diet's decisions. He has no power to interfere with a Jassak in the local administration of his own "Ho-shun." In other words, the president of the league acts as an intermediary between the Peking Government and the Jassaks. Through him the former promulgates its orders and through him the latter secure presidential sanction to their joint decisions.

These leagues are supervised by some high officials—namely the Tu-tung's in Inner Mongolia and the Resident Ambans in Outer Mongolia. Up to 1911 when Mongolia declared independence, the administrative divisions were as follow:

I—Inner Mongolia (the region south and south-east of the Gobi Desert:—(a) The six leagues of Inner Mongols; (b) the Chahars; (c) the Kueihuach'eng Tumets; (d) the Alashan Mongols; and (e) the Estingol old Tanguts.

II—Outer Mongolia (the region north of the Gobi Desert):—(a) The four leagues of Khalkas; (b) the Kobdo District; (c) the Altai District; and (d) the Tannu-Urianghai Lands.

When China in 1913, under pressure from Russia, recognized the autonomy of Outer Mongolia, the latter's status was altered, coming under the rule of its Living Buddha. But Autonomous Mongolia did not include the Altai District which, by a recent Presidential mandate, was elevated into a Tao circuit and amalgamated into the neighboring province of Sinkiang. The administration of Inner Mongolia has always remained practically the same, and the various divisions are under the separate supervision of the governors respectively of Kansu, Mukden, Heilungkiang, and the Tut'ungs of Jehol, Kalgan, Suiyuanch'eng and Kueihuach'eng.

Embracing an area of 1,367,900 square miles, Mongolia constitutes one-third of the territory of the whole Republic, being slightly smaller than the 18 provinces put together. Bounded on the north by Siberia, on the south by the provinces of Kansu, Shensi, Shansi, and Chihli, on the south-west by Sinkiang (New Dominion), and Manchuria on the east, it is a table-land with three chief divisions:—(a) A high plateau of 3,005-5,000 feet in the north-western corner; (b) A central plateau, called the Gobi Desert, extending north-west to south-west for 1,000 miles, thus separating Outer from Inner Mongolia; and (c) a fertile, undulating and in some places thickly wooded region on the south and south-east of the Desert.

Excepting the Gobi region, the country is fairly well watered and here and there, especially in the mountain-plateau, lakes are scattered. The climate, however, is subject to extremes of both heat and cold. For example, in the Desert a furcoat is required after a rain even on a June mid-day, but the next day it may be excessively hot. Because of these climatic vagaries, most of the lakes are often dried up, but from them a considerable quantity of salt is obtained. When water is scarce, it can be easily had by sinking wells to a mere depth of 20 to 30 feet. For the most part the land is admirably suited to stock raising, and the regions north of Kalgan and near Urga, the capital city, are good for planting oats, millet, buckwheat, and even rice.



And in the so-called Desert itself are large areas of grass land. Consequently, an American traveller recently testified as follows: "The chief impression of the great country lying between Kalgan and Urga and beyond is that it is like the prairies of Nebraska and Texas with 100 per cent. better potentialities than exist in the great west of the United States. There is more water on the Mongolian table-land than on the Nebraskan or Texan prairies, and conditions are easier."

The Mongols are, as of yore, a nomadic race, and it is only recently that they have taken to a semi-settled sort of life. They live in primitive yurts or felt tents, which can be easily folded and packed away. Through habit and experience the various tribes have become more or less fixed to certain localities, and families are known to change their abodes twice a year, once in summer and once in winter. The state religion of the Mongols is Lamaism, an off shoot of Buddhism introduced into the country by the great Kublai Khan—the first emperor of the Mongol or Yuan Dynasty in China (A.D. 1280-1368). It has a remarkably strong hold over the people, so much so that at least one-third of the male population are said to be Lamas, or that one member of almost every family has at one time or other been a Lama of some order. Next to Lamaism, the celibate injunction of which is chiefly responsible for the country's reduced population, the principal occupation of a Mongol is stock-raising. Consequently a man's wealth is computed by the number of sheep, cattle, horses or camels he possesses. A Mongol and his horse are inseparable companions, so he will never walk beyond a few hundred yards—a fact which explains his awkward gait in walking.

Not much is known accurately of Mongolia's resources, beyond the fact that it is rich in fur-bearing animals, such as wolves, foxes, hares, squirrels, etc., and also in vast areas of pasture land. A foreign expert, however, has recently estimated that Inner Mongolia alone contains 353 mines, of which 89 are gold mines, 23 silver, 63 copper, and iron, and 127 coal mines, in addition to 51 containing both gold and silver. It is reported that Outer Mongolia is equally rich in mineral products and that the Russian Mongolian Mining Company has been working on gold in this vast region. Gold dust is found in large quantities even in rivers. The Mongolian fur trade is also profitable, and before the Great War the fur market in Leipzig is known to have had its whole supply from Mongolia. Finally, fishery promises to be a paying industry, and fish abound in all Mongolian rivers.

In regard to trade there is merely the interchange of raw materials. The simple, primitive Mongols are good horsemen and hunters, but know next to nothing about commerce beyond simple barter. Consequently, trade in Mongolia is carried on entirely by the Russians and Chinese, so almost everything is brought to them by the latter. Among their principal purchases are cotton fabrics, iron ware, woollen cloth, sugar and brick-tea; the last is their favorite. In return they offer sheep, cattle, ponies, camels, wool, hides, furs, etc. Every year they also export thousands of tons of salt and soda as well as some quantity of gold. Money, therefore, as a medium of exchange is not yet universally appreciated, except in large trading centres where gold dust, gold bars, lump silver, silver and paper roubles, and also silver dollars are in use. Tea in the form of bricks can also take the place of metallic coins. The main trading centres are Urga, the capital; Kiakhta, the chief gateway to Siberia; Kobdo and Uliassutai.

This, then, is a bird's-eye view of the country which to-day is once more attracting public attention. It is a knowledge which cannot be overlooked if one is to appreciate intelligently the developments of the last eight years.

We speak of the Mongols declaring independence in 1911 and of their returning to the fold of the Republic in November 1919, as if the one act of declaration and the other of cancellation were ordinary, commonplace things. As a matter of fact, all the evidence and presumptions indicate that Mongolia's act of session could never have been voluntary or spontaneous. If the people were too primitive even for the conduct of ordinary trade and commerce, it is unthinkable that they could have appreciated enough of politics to desire willingly to break away from the body politic of which they had been an integral part since the days when the Manchus entered the Great Wall. For, as already mentioned, their ancestors became vassals of the Tsing Dynasty of their own accord. On the other hand, the sins of the instigating outside

party have never been more convincingly demonstrated. For this purpose the documents in black and white concluded between the parties will best speak for themselves. We will narrate these events in their proper sequence.

On October 10, 1911, the Chinese Revolution broke out. Taking advantage of this juncture the Khalkas expelled the Chinese Amban from Urga, declared independence and proclaimed the Hut'ukht'u, the Living Buddha, as their ruler. Strange to say, and against all healthy precedents in international law, this imperfect independence was immediately recognized by Russia, for palpable purposes. Just as the Republic of Panama was recognized by the United States of America less than a fortnight after it had revolted from Colombia, and then the agreement was concluded giving the recognizing state the right to build the present Panama Canal, so the Urga Government was recognized by Petrograd and the Russo-Mongolian agreement of October 21-November 3, 1912, concluded. The new Chinese Republic was in no position to resist Russia's "persuasions," and in the declaration as well as exchange of notes of October 23-November 5, 1913, this nation was constrained to recognize the autonomy of Outer Mongolia. The new relationship between China, Russia and Outer Mongolia was finally confirmed in the tripartite convention signed at Kiakhta on May 25, June 7, 1915.

We have said that in regard to the 1911 *coup d'état* at Urga, all unprejudiced authors agree that it was the work of "Russian instigation." In fairness to Russia it is admitted that there were other factors which might have contributed to the movement; for example, the Living Buddha was known to be striving for temporal power, and the Chinese Amban was known to have estranged the Mongol princes by his indiscretion and arrogance. But these are not enough to explain the riddle, and Russia would appear in a better light to posterity if she had not profited most from the various agreements and conventions signed between her and the Urga Government as well as between Petrograd and Peking.

For this reason we append the texts of (1) the Russo-Mongolian agreement and protocol, 1912; (2) Sino-Russian declaration and exchange of notes 1913, and (3) Russo-Mongolian railway agreement, 1914. They are now valuable for their intrinsic historic interest. The first is published in a British Blue Book (Parliamentary Paper, Cd. 6604), the translation having been communicated to Downing Street by the British Ambassador in Petrograd. The second is reproduced from the "American Journal of International Law," Supplement, October 1916, and the third is from the defunct "Peking Gazette," December 8, 1914.

A glance at these treaties and agreements will show the extent of Russia's privileged position in autonomous Mongolia. For example, neither Chinese troops were admitted into Outer Mongolia nor Chinese subjects were permitted to colonize her lands (see Russo-Mongolian agreement, Article 1, and Russo-Chinese declaration, Article 3). Russia promises to "assist Mongolia to maintain the autonomous régime which she has established as also the right to have her national army," and so are given numerous rights and privileges enumerated in sixteen articles and annexed to the agreement as a protocol. These consist of the right to reside and move freely from one place to another, to engage in any kind of commercial, industrial and other business (Article 1); the right to import and export, at all times, "without payment of import and export dues," and also "to trade freely in it without payment of any dues, taxes or other dues" (Article 2); the right to enter into agreement with the Mongolian Government respecting the working of minerals and timber, fisheries, etc. (Article 7); and the right to feed travelling cattle on pasturage lands assigned by local Mongolian authorities, free for a period of three months (Article 14), etc. Russia recognizes the right of Mongolia to construct its own railways, but "should the Mongolian Government desire to concede such (construction) rights to other countries, the Mongolian Government, for the sake of friendly relations with Russia, should discuss this matter with the Russian Government, before the former makes the actual concession, in order to ascertain whether the projected lines of railway would jeopardise Russian interests from an economic or military standpoint" (Article 5, 1914).

In other words, Russia was to enjoy in Outer Mongolia a position as favorable as that of China was the reverse. Not only were Chinese forbidden to colonize therein but those already there



were to pay all the taxes on internal trade. Therefore imports from this country paid a 5 per cent. *ad valorem* duty. Her commercial supremacy being assured, Russia proceeded to entrench herself also politically. And this was effected by the exchange of notes with China, 1913, which provided that "as regards questions of a political and territorial nature, the Chinese Government shall come to an agreement with the Russian Government through negotiations in which the authorities of Outer Mongolia shall take part." The results of such tripartite negotiations were embodied in the Kiachta convention signed on May 25/June 7, 1915, the text of which was published in the FAR EASTERN REVIEW, June, 1915. This convention recognizes on the one hand the suzerainty of the Republic and on the other the autonomy of Outer Mongolia.

This then was Russia's gain: commercial supremacy in autonomous Mongolia and a concurrent right with the Republic to supervise the political relations of China's vassal. The dreaded march of the intrepid Chinese colonists into Russia was stopped and thus was created an effective buffer state between herself and the new Republic.

This is as far as official documentary evidence take us. But proofs of the colossus's designs were freely bruited about during the negotiations leading up to the agreements of 1912-1913. For example, in consideration of the protection offered by the Petrograd Government, the Hut'ukht'u agreed to let Russia build a railway from Kiachta, on the Siberian border, to Urga, the capital of autonomous Mongolia. At the same time the former sold a large number of obsolete guns discarded by the Czar's army and advanced a loan of one million dollars to the Mongols, the loan being secured on the revenue derived from the districts near Kobdo where Russian tax collectors were stationed.

China herself was not prepared to acknowledge defeat so easily. And as a bid for popularity the following Presidential mandate was issued, changing the status of former dependencies. "The five races in this country are entitled to equal treatment in the Republic, and the territories of the Mongols, the Tibetans, and the Mohammedans are parts of the same Republic of China. The Mongols, the Tibetans and the Mohammedans are all its citizens. There is no more distinction between them, as was the case during the Imperial rule. Thus no such name as 'dependencies' shall be used any more. Hereafter the Mongols, Tibetans and Mohammedans should live in perfect harmony so as to bring about a real union of the races into one. The Republican Government will not establish a department for dependencies, in view of the fact that they are to be treated equally as the other parts of the state, namely the interior provinces. All matters concerning these places will be included in the administration of Home Affairs," etc., etc.

Consequently the Li Fan Pu or Ministry of Dependencies was abolished and a Bureau of Mongolian and Tibetan Affairs created and placed under the immediate control of the Cabinet. In the Chinese Parliament Mongolia is represented by 27 members in the House of Representatives and by an almost equal number in the Senate.

As expected, it did not take the Mongols long to find out the real intentions of their Russian "protectors" and, except for a few "militarists" at Urga, the majority of the Hoshuns and Aimaks preferred to return to the fold of the Republic. Despite the efforts of the Russian government, the trade of Russian merchants was not able to compete with that of the Chinese. Because, it is said, on the one hand Russian goods were not so suitable to the Mongols' use and taste as those of the Chinese and, on the other, the former were out only to reap large returns within a short space of time. For example, a Russian merchant once complained that his profits had fallen as low as 20 per cent. Then came the War in Europe and, of course, the volume of Russian trade was reduced almost to *nil*. The onrushing tide of Bolshevism on the further side of the frontier serves to intensify the universal feeling of rejoining the Chinese Republic. Accordingly the following petition praying for cancellation of autonomy was despatched to the Chinese Government:—

"We, the Ministers and Vice-Ministers (here follow their names and ranks) of all the departments of the autonomous Government of Outer Mongolia, and all the princes, dukes, hut'ukt'us and lamas and others resident at Urga, hereby jointly and severally submit the following petition for the esteemed perusal of His Excellency the President of the Republic of China.

"Outer Mongolia has been a dependency of China since the reign of the Emperor K'ang Hsi, remaining loyal for over two hundred years, the entire population, from princes and dukes down to the common people having enjoyed the blessings of peace. During the reign of the Emperor Taokuang changes in the established institutions, which were opposed to Mongolian sentiments, caused dissatisfaction which was aggravated by the corruption of the administration officers during the last days of the Manchu Dynasty. Taking advantage of this Mongolian dissatisfaction, foreigners instigated and assisted the independence movement. Upon the Kiakhta Convention being signed the autonomy of Outer Mongolia was held a *fait accompli*, China retaining an empty suzerainty while the officials and people of Outer Mongolia lost many of their old rights and privileges. Since the establishment of this autonomous government no progress whatsoever has been chronicled, the affairs of government being indeed plunged in a state of chaos and causing deep pessimism.

"Lately, chaotic conditions have also reigned supreme in Russia, reports of revolutionary elements threatening our frontiers having been frequently received. Moreover, since the Russians have no united government, it is only natural that they are powerless to carry out the provisions of the treaties; and now that they have no control over their subjects, the Buriat tribes have constantly conspired and co-operated with bandits, and repeatedly sent delegates to Urga urging our Government to join with them and form a Pan-Mongolian nation. That this propaganda work, so varied and so persistent, which aims at usurping Chinese suzerainty and undermining the autonomy of Outer Mongolia, does more harm than good to Outer Mongolia, our Government is well aware. The Buriats, with their bandit allies, now considering us unwilling to espouse their cause, contemplate despatching troops to violate our frontiers and compel our submission. Furthermore, forces from the so-called White Army have forcibly occupied Tannu Urianghai, an old possession of Outer Mongolia, and attacked both Chinese and Mongolian troops, this being followed by the entry of the Red Army, thus making the situation impossible.

Now that our internal and external affairs have reached such a climax, we, the Members of the Government, in view of the present situation, have assembled all the princes, dukes, lamas and others and have held frequent meetings to discuss the question of our future welfare. Those present have been unanimously of the opinion that the old bonds of friendship having been restored, our autonomy should be cancelled, since Chinese and Mongolians are filled with a common purpose and ideal.

"The result of our decision has been duly reported to His Holiness the Bogdo Jeptsun Damba Hut'ukht'u Khan and has received his approval and support. Such being the position we now unanimously petition His Excellency the President that the old order of affairs be restored.

(Signed) Premier and Acting Minister of the Interior, Prince Lama Batma Torgee;  
Vice-Minister, Prince of Tarkhan Puntzuk Cheilin;  
Vice-Minister, Great Lama of Beliktu, Prince Puntzuk Torgee;  
Minister of Foreign Affairs, Duke Cheilin Torgee;  
Vice-Minister, Dalai Prince Cheituntun Lomour;  
Vice-Minister, Prince of Ochi, Kaotzuktanba;  
Minister of War, Prince of Elteni Jamuyen Torgee;  
Vice-Minister, Prince of Elteni Selunto Chihleh;  
Vice-Minister, Prince of Elteni Puntzuk Laptan;  
Vice-Minister, Prince of Itkemur Chitu Wachir;  
Minister of Finance, Lama Prince Loobitsan Galetan;  
Vice-Minister, Prince Torgee Cheilin;  
Vice-Minister, Prince of Suchuketu Tehmutzu Kejwan;  
Minister of Justice, Dalai of Chiechenkhan Wananin;  
Vice-Minister, Prince of Daichinchihlun Chackebbateherhu;  
Vice-Minister, Prince of Choliketu Lama Dashtunyupu."

The above was received in Peking on November 17, 1919, and five days later a Presidential Mandate was promulgated granting the request. On November 23 Reuter's agency issued a lengthy statement on the subject from the Chinese Ministry of Foreign Affairs justifying the action of the Republic in accepting such cancellation of independence. It concluded with the following pregnant passage:—"The Government of China, in complying with this earnest appeal to restore the old order of affairs, is moved by the heartfelt desire to assist in the establishment of general peace on an enduring basis. It was impossible to continue arrangements which had obviously lapsed owing to the dissolution of the Russian Empire and which were a constant invitation to unrest. The policy now being carried out is in strict agreement with the frontier principles established by the late dynasty: for China sixty years ago anticipated the ruling of the recent Paris Peace Conference that a fundamental necessity exists to give all nations access to the sea—her cession of the left bank of the Amur, together with the right of navigation on that great waterway, coupled with frontier trade privileges, having conferred on the Russian people all that they could legitimately claim beyond Lake Baikal. To-day, as in the case of Persia, where an arrangement which had been made by the late Russian Government has likewise automatically terminated, and been replaced by a new Treaty freely entered into and more in consonance with existing circumstances, the frank appeal of the Urga Government to the Republic of the Five Races marks a new



stage in world reorganization. It is now not too much to hope that in the not distant future general peace and tranquility will reign throughout every district of the Chinese domain, and promote all those high objects of civilization which are to-day so constantly in the thoughts and declarations of statesmen and peoples alike."

The cancellation of Mongolian independence being thus an accomplished fact, measures are already being devised to reform and develop that rich country. For example, the Mongolian-Tibetan School in Peking is being reorganized; the establishment of schools and other educational institutions in the various Ho-shuns in Mongolia is being encouraged; and a Mongol vernacular paper will soon be published. Besides, waste lands will be reclaimed and railways will be built, etc. And, as regards the foreign debt of the Autonomous Mongolian Government which amounts to five million roubles, the same will be repaid by the Peking Government in one instalment so as to recover promptly the rights and privileges secured to foreigners thereon.

### Agreement Between Russia and Mongolia.

(Signed at Urga, October 21/November 3, 1912).

In accordance with the desire unanimously expressed by the Mongolians to maintain the national and historic constitution of their country, the Chinese troops and authorities were obliged to evacuate Mongolian territory, and Djebzoun Damba-Hut'ukht'u was proclaimed Ruler of the Mongolian people. The old relations between Mongolia and China thus came to an end.

At the present moment, taking into consideration the facts stated above, as well as the mutual friendship which has always existed between the Russian and Mongolian nations, and in view of the necessity of defining exactly the system regulating trade between Russia and Mongolia;

The Actual State Councillor Ivan Korostovetz, duly authorized for the purpose by the Imperial Russian Government; and

The Protector of the Ten Thousand Doctrines Sain-noin Khan Namnan-Souroun, President of the Council of Ministers of Mongolia;

The Plenipotentiary Tchin-souzouktou Tzin-van Lama Tzerin-Tchimet, Minister of the Interior;

The Plenipotentiary Daitzin-van Handa-dorki, of the rank of Khan-erdeni, Minister for Foreign Affairs;

The Plenipotentiary Daitzin-van Handa-dorki, of the rank of Khan-erdeni, Minister for Foreign Affairs;

The Plenipotentiary Erdeni Dalai Tzun-van Gombo-Souroun, Minister of War;

The Plenipotentiary Touchetou Tzun-van Tchakdorjab, Minister of Finance;

The Plenipotentiary Erdeni Tzum-van Namsarai, Minister of Justice; Duly authorized by the Ruler of the Mongolian nation, by the Mongolian Government and by the ruling Princes, have agreed as follows:—

#### Article I.

The Imperial Russian Government shall assist Mongolia to maintain the autonomous régime which she has established, as also the right to have her national army, and to admit neither the presence of Chinese troops on her territory nor the colonization of her land by the Chinese.

#### Article II.

The Ruler of Mongolia and the Mongolian Government shall grant, as in the past, to Russian subjects and trade the enjoyment in their possession of the rights and privileges enumerated in the protocol annexed hereto.

It is well understood that there shall not be granted to other foreign subjects in Mongolia rights not enjoyed there by Russian subjects.

#### Article III.

If the Mongolian Government finds it necessary to conclude a separate treaty with China or another foreign Power, the new treaty shall in no case either infringe the clauses of the present agreement and of the protocol annexed hereto, or modify them without the consent of the Imperial Russian Government.

#### Article IV.

The present amicable agreement shall come into force from the date of its signature.

In witness whereof the respective plenipotentiaries, having compared the two texts, Russian and Mongolian, of the present agreement, made in duplicate, and having found the two texts to correspond, have signed them, have affixed thereto their seals, and have exchanged texts.

Done at Urga on the 21st October, 1912, corresponding to the 24th day of the last autumn month of the 2nd year of the reign of the Unanimously Proclaimed, according to the Mongolian calendar.

### Protocol Annexed to above Agreement.

By virtue of the enactment of the second article of the agreement, signed on this day between Actual State Councillor, Ivan Korostovetz, Plenipotentiary of the Imperial Russian Government, and the President of the Council of Ministers of Mongolia (names and titles as above)—the above-named plenipotentiaries have come to an agreement respecting the following articles, in which are set forth the rights and privileges of Russian subjects in Mongolia, some of which they already enjoy, and the rights and privileges of Mongolian subjects in Russia:

#### Article I.

Russian subjects, as formerly, shall enjoy the right to reside and move freely from one place to another throughout Mongolia; to engage there in any kind of commercial, industrial and other business; and to enter into agreements of various kinds, whether with individuals, or firms, or institutions, official or private, Russian, Mongolian, Chinese, or foreign.

#### Article II.

Russian subjects, as formerly, shall enjoy the right at all times to import and export, without payment of import and export dues, every kind of product of the soil and industry of Russia, Mongolia and China, and other countries, and to trade freely in it without payment of any dues, taxes, or other dues.

The enactment of this (2nd) article shall not extend to combined Russo-Chinese undertakings, or to Russian subjects falsely declaring themselves to be owners of wares not their property.

#### Article III.

Russian credit institutions shall have the right to open branches in Mongolia, and to transact all kinds of financial and other business, whether with individuals, institutions, or companies.

#### Article IV.

Russian subjects may conclude purchases and sales in cash or by an exchange of wares (barter), and they may conclude agreements on credit. Neither "Ho-shuns" nor the Mongolian Treasury shall be held responsible for the debts of private individuals.

#### Article V.

The Mongolian authorities shall not preclude Mongolians or Chinese from completing any kind of commercial agreement with Russian subjects, from entering into their personal service, or into commercial and industrial undertakings formed by them. No rights of monopoly as regards commerce or industry shall be granted to any official or private companies, institutions, or individuals in Mongolia. It is, of course, understood that companies and individuals who have already received such monopolies from the Mongolian Government previous to the conclusion of this agreement shall retain their rights and privileges until the expiry of the period fixed.

#### Article VI.

Russian subjects shall be everywhere granted the right, whether in towns or "Ho-shuns," to hold allotments on lease, or to acquire them as their own property for the purpose of organizing commercial, industrial establishments, and also for the purpose of constructing houses, shops, and stores. In addition, Russian subjects shall have the right to lease vacant lands for cultivation. It is, of course, understood that these allotments shall be obtained and leased for the above-specified purposes, and not for speculative aims. These allotments shall be assigned by agreement with the Mongolian Government in accordance with existing laws of Mongolia, everywhere excepting in sacred places and pasture lands.

#### Article VII.

Russian subjects shall be empowered to enter into agreement with the Mongolian Government respecting the working of minerals and timber, fisheries, etc.

#### Article VIII.

The Russian Government shall have the right, in agreement with the Government of Mongolia, to appoint consuls in those parts of Mongolia it shall deem necessary.

Similarly, the Mongolian Government shall be empowered to have Government agents at those frontier parts of the empire where, by mutual agreement, it shall be found necessary.

#### Article IX.

At points where there are Russian consulates, as also in other localities of importance for Russian trade, there shall be allotted, by mutual agreement between Russian consuls and the Mongolian Government, special "factories" for various branches of industry and the residence of Russian subjects. These "factories" shall be under the exclusive control of the above-mentioned consuls, or the heads of the Russian commercial companies if there be no Russian consul.

#### Article X.

Russian subjects, in agreement with the Mongolian Government, shall retain the right to institute, at their own cost, a postal service for the despatch of letters and the transit of wares between various localities in Mongolia and also between specified localities and points on the Russian frontier. In the event of the construction of "stages" and other necessary buildings, the regulations set forth in Article VI of this protocol must be duly observed.

#### Article XI.

Russian consuls in Mongolia, in case of need, shall avail themselves of Mongolian Government postal establishments and messengers for the despatch of official correspondence, and for other official requirements, provided that the gratuitous requisition for this purpose shall not exceed one hundred horses and thirty camels per month. On every occasion, a courier's passport must be obtained from the Government of Mongolia. When travelling, Russian consuls, and Russian officials in general, shall avail themselves of the same establishments upon payment. The right to avail themselves of Mongolian Government "stages" shall be extended to private individuals, who are Russian subjects, upon payment for the use of such "stages" of amounts which shall be determined in agreement with the Mongolian Government.



## Article XII.

Russian subjects shall be granted the right to sail their own merchant vessels on, and to trade with the inhabitants along the banks of, those rivers and their tributaries which, running first through Mongolia, subsequently enter Russian territory. The Russian Government shall afford the Government of Mongolia assistance in the improvement of navigation on these rivers, the establishments of the necessary beacons, etc. The Mongolian Government authorities shall assign on these rivers places for the berthing of vessels, for the construction of wharves and warehouses, for the preparation of fuel, etc., being guided on these occasions by the enactments of Article VI of the present protocol.

## Article XIII.

Russian subjects shall have the right to avail themselves of all land and water routes for the carriage of wares and the driving of cattle, and, upon agreement with the Mongolian authorities, they may construct, at their own cost, bridges, ferries, etc., with the right to exact a special due from persons crossing over.

## Article XIV.

Travelling cattle, the property of Russian subjects, may stop for the purpose of resting and feeding. In the event of prolonged halts being necessary, the local authorities shall assign proper pasturage areas along travelling cattle routes, and at cattle markets. Fees shall be exacted for the use of these pasturing areas for periods exceeding three months.

## Article XV.

The established usage of the Russian frontier population harvesting (hay), as also hunting and fishing, across the Mongolian borders shall remain in force in the future without any alteration.

## Article XVI.

Agreements between Russian subjects and institutions on the one side and Mongolians and Chinese on the other be concluded verbally or in writing, and the contracting parties may present the agreement concluded to the local government authorities for certification. Should the latter see any objection to certifying the contract, they must immediately notify the fact to a Russian consul, and the misunderstanding which has arisen shall be settled in agreement with him.

It is hereby laid down that contracts respecting real estate must be in written form, and presented for certification and confirmation to the proper Mongolian Government authorities and a Russian consul. Documents bestowing rights to exploit natural resources require the confirmation of the Government of Mongolia.

In the event of disputes arising over agreements concluded verbally or in writing, the parties may settle the matter amicably with the assistance of arbitrators selected by each party. Should no settlement be reached by this method, the matter shall be decided by a mixed legal commission.

There shall be both permanent and temporary mixed legal commissions. Permanent commissions shall be instituted at the places of residence of Russian consuls, and shall consist of the consul, or his representative, and a delegate of the Mongolian authorities of corresponding rank. Temporary commissions shall be instituted at places other than those already specified, as cases arise, and shall consist of representatives of a Russian consul and the prince of that "Ho-shun" to which the defendant belongs or in which he resides. Mixed commissions shall be empowered to call in as experts persons with a knowledge of the case from among Russian subjects, Mongolians, and Chinese. The decisions of the mixed legal commissions shall be put into execution without delay, in the case of Russian subjects through a Russian consul, and in the case of Mongolians and Chinese through the prince of the "Ho-shun" to which the defendant belongs or in which he is resident.

## Article XVII.

The present protocol shall come into force from the date of its signature.

In witness whereof, the respective plenipotentiaries, finding, upon comparison of the two parallel texts of the present protocol—Russian and Mongol—drawn up in duplicate, that the texts correspond, have signed each of them, affixed their seals, and exchanged texts.

Executed at Urga, the 21st October, 1912 (o.s.), and by the Mongolian calendar, on the 24th day of the last autumn moon, in the second year of the administration of the Unanimously Proclaimed.

(In the original follow the signature of M. Korostovetz, Minister Plenipotentiary; and in the Mongol language the signatures of the President of the Mongolian Council of Ministers, and the Plenipotentiaries the Ministers of the Interior, Foreign Affairs, War, Finance, and of Justice).

## Declaration and Exchange of Notes by Russia and China.

(Signed at Peking, October 23/November 5, 1913).

The Imperial Government of Russia having formulated the principles which it took as the basis of its relations with China as regards Outer Mongolia, and the Government of the Chinese Republic having stated its approval of the said principles, the two governments have agreed upon the following:—

## Article I.

Russia recognizes that Outer Mongolia is under the suzerainty of China.

## Article II.

China recognizes the autonomy of Outer Mongolia.

## Article III.

Recognizing the exclusive right of the Mongols of Outer Mongolia to provide for the internal administration of Autonomous Mongolia and to settle all questions of a commercial and industrial nature relating

to this country, China binds itself not to intervene in these matters and consequently will not send troops to Outer Mongolia, nor will it keep any civil or military officials there, and it will abstain from colonizing in this country. It is, however, understood that a Dignitary sent by the Chinese Government may reside at Urga, accompanied by the necessary subordinates and an escort. Moreover, the Chinese Government may, in case of need, keep in certain localities in Outer Mongolia, to be determined in the course of the conferences provided for in Article V of the present agreement, agents for the protection of the interests of its subjects. Russia, on its side, binds itself not to keep troops in Outer Mongolia, with the exception of consular guards, and not to intervene in any branch of the administration of this country and to abstain from colonizing.

## Article IV.

China declares itself ready to accept the good offices of Russia for the establishment of its relations with Outer Mongolia, in conformity with the principles above set forth and with the stipulations of the Russo-Mongolian Commercial Protocol of October 21, 1912 (November 3, 1912).

## Article V.

Questions pertaining to the interests of Russia and of China in Outer Mongolia and resulting from the new state of affairs in this country will be the subject of subsequent conferences.

In faith whereof the undersigned, duly authorized to this effect, have signed the present Declaration and have affixed their seals thereto.

Done at Peking, in duplicate, October 23/November 5, nineteen hundred and thirteen, corresponding to the fifth day of the eleventh month of the second year of the Chinese Republic.

SUN PAO-CH'I (Minister of Foreign Affairs).  
B. KRUPENSKY (Russian Minister).

## Note of the Russian Minister at Peking to the Chinese Minister for Foreign Affairs.

In signing the Declaration under date of this day relating to Outer Mongolia, the undersigned, Envoy Extraordinary and Minister Plenipotentiary of His Majesty the Emperor of all the Russias, duly authorized to this effect, has the honor to declare, in the name of his government, to His Excellency Mr. Sun Pao-ch'i, Minister of Foreign Affairs of the Chinese Republic, the following:—

1.—Russia recognizes that the territory of Outer Mongolia is a part of the territory of China.

2.—As regards questions of a political and territorial nature, the Chinese Government shall come to an agreement with the Russian Government through negotiations in which the authorities of Outer Mongolia shall take part.

3.—The conferences provided for in Article V of the Declaration shall take place between the three interested parties, who shall designate for this purpose a place where their delegates shall meet.

4.—Outer Mongolia shall comprise the regions which have been under the jurisdiction of the Chinese Amban of Urga, of the Tartar-General of Uliassutai, and of the Chinese Amban of Kobdo. Inasmuch as there are no detailed maps of Mongolia and as the boundaries of the administrative divisions of this country are uncertain, it is agreed that the exact boundaries of Outer Mongolia, as well as the boundary between the district of Kobdo and the district of Altai, shall be the subject of the subsequent conferences provided for in Article V of the Declaration.

The undersigned takes advantage of this opportunity to repeat to His Excellency Mr. Sun Pao-ch'i the assurances of his very high consideration.

(Sgd.) B. KRUPENSKY.

## Note of the Chinese Minister for Foreign Affairs to the Russian Minister at Peking.

In signing the Declaration under date of this day relating to Outer Mongolia, the undersigned, Minister of Foreign Affairs of the Chinese Republic, duly authorized to this effect, has the honor to declare, in the name of his government, to His Excellency Mr. Krupensky, Envoy Extraordinary and Minister Plenipotentiary of His Majesty the Emperor of all the Russias, the following:—

1.—Russia recognizes that the territory of Outer Mongolia is a part of the territory of China.

2.—As regards questions of a political and territorial nature, the Chinese Government shall come to an agreement with the Russian Government through negotiations in which the authorities of Outer Mongolia shall take part.

3.—The conferences provided for in Article V of the Declaration shall take place between the three interested parties, who shall designate for this purpose a place where their delegates shall meet.

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The undersigned takes advantage of this opportunity to repeat to His Excellency Mr. Krupensky the assurance of his very high consideration.

(Sgd.) SUN PAO-CH'I.



### Russo-Mongolian Railway Agreement.

(Signed at Kiachta, September 30, 1914).

#### Article I.

The Russian Government hereby recognizes the permanent right of the Mongolian Government to build railways within the boundaries of its own territory.

#### Article II.

The Russian and Mongolian Governments shall consult each other to decide the railway lines and procedure of their building, which should be carried out in such a way as to benefit both parties concerned.

#### Article III.

In case of railway building, whether financed by the Russian or Mongolian Government or by private persons, the Russian Government shall render adequate help to the Mongolian Government.

#### Article IV.

When such railways as will connect with the railways on Russian frontiers are to be built, the Russian and Mongolian Governments shall consult each other on the terms concerning the privileges, localities and railway revenue regarding the same.

#### Article V.

Whereas the Mongolian Government has the right to build railways within the boundaries of its own territory, if it can raise funds internally to build paying railways, the Russian Government shall not interfere with it. But should the Mongolian Government concede such rights to other countries, the Mongolian Government, for the sake of friendly relations with Russia, should discuss this matter with the Russian Government, before the former makes the actual concession, in order to ascertain whether the projected lines of railway would jeopardize the Russian interest from an economic or military standpoint.

#### Article VI.

This treaty shall be duplicated in both the Mongolian and Russian languages. One copy shall be deposited in the office of the Russian Consul-General in Mongolia and the other in the office of the Ministry of Foreign Affairs of the Mongolian Government.

### Agreement Between China, Russia, and Mongolia.

This agreement was signed on May 25/June 7, 1915, at Kiachta, and was published in the FAR EASTERN REVIEW, of June, 1915.

## Canton City Wall Replaced by Road

A little over a year ago the Canton Municipal authorities began work upon the improvement of the city by tackling the demolition of the city wall. Mr. H. L. Wu, C.E., was in charge and began operations upon the western section of the old wall, built about 800 years ago. This was demolished and the work on the remainder of the wall was let out from time to time to different contractors by open tender. Most of the wall is by this time torn down, and in a few more months it should be entirely replaced by a well-made modern road. By the end of June last two miles of the wall had already made way for a macadamised road, and since then more has been added.

The entire length of the wall, including the old section, built some 800 years ago, and the so-called new city wall, built some 500 years ago, is about six miles. The average height of the former is 24 feet, with a width of 43 feet at the bottom and 35 feet at the top; while the latter is about 15 feet high, and 17 feet wide at the bottom and 13 feet at the top. The total earthwork which had to be disposed of was some 792,700 cubic yards, and it has been shifted from the site mostly on small boats plying on the numerous small waterways about the city. With the exception of the new city wall section all the useful material such as bricks and stones removed from the wall were returned to the Municipality by the various contractors.

A difficulty which faced the engineers when they came to arrange for the demolition of the wall and construct a roadway in its place was the great difference in levels of the land within and without the wall. On one side houses were found to be two or three feet below the street level while on the opposite side of the same road they were four or five feet above the street. In many places in the north-western section the ground level inside the city wall is as much as from 15 to 22 feet above that on the outside. This necessitated the demolition of the wall to a general level of the inside ground and the provision of steps at intervals to communicate with the lower levels on the outside.

When it was decided to replace the wall with a modern roadway the Municipal authorities determined to make the road a

wide one at once, and despite the existence of houses fixed the measurement at from 80 to 100 feet. This meant that more than 3,500 houses had to be condemned. As a tramway system may eventually be installed all the street corners were designed with at least 50 feet radii, while existing bridges and T culverts had to be replaced by structures of new design to carry the expected heavier traffic.

The cost of the work per linear foot, including transportation, excavation, and some retaining walls, varies. On the old wall it ranged from \$7.45 to \$22, and on the so-called new city wall from \$2.25 to \$4.45. The total cost of the entire work is estimated to be \$350,735. It is interesting to point out that despite deplorable existing conditions the authorities were able to carry out the improvement without danger of forcible public opposition because it was early discovered that with the improvements land values rose by leaps and bounds, and lots of Government land hitherto almost valueless have been sold for more than half a million dollars.

## Oil-Hardening a Water-Hardening Steel

Users of tool steel in the Colonies or in far distant countries often find themselves up against steel problems which must be solved at once somehow or other, as time will not allow of the necessary information being obtained from the maker of the steel. Such problems are often tackled in extremely ingenious ways, and the difficulties overcome.

Recently a visitor to the Imperial Steel Works home on leave from an engineering works in China, explained how, during the War, he overcame various difficulties; but he was still dissatisfied with the way he had had to tackle one of them.

The problem in question was how to make and harden successfully a small circular cutter about 4-in. diameter and  $\frac{3}{16}$ -in. thick, with a bevelled edge. He had been making these by parting off a disc of the necessary thickness from a 4-in. diameter steel bar, and hardening the finished cutter in water. He complained that he was only able to harden about 1 in 4 cutters without their cracking, or proving defective in other ways, which is not surprising.

The disadvantage of operating at a great distance from the source of supply, and perhaps with native labor, is that workshop tradition is absent. The best rule-of-thumb experience cannot provide for every difficulty; and successful tool-making demands skilled and experienced workers wherever practised. The wonder is, not that troubles occur, but that the Briton in exile so often manages to overcome them. Had our informant been working in England, he would probably not have attempted to make these cutters at all; they are not a job for the all-round tool-maker. The revised edition of the Edgar Allen Catalogue "G" contains directions for treating all Edgar Allen-Steels: but it provides, of course, for ordinary work, not for exceptional emergency. Instructions for treating tool-steels are framed to suit the kind of use for which the steel is in practically all instances required. Out-of-the-way tools require some modification of the routine treatment.

In this case, if the cutter had been hardened in oil instead of water, it is quite possible that the cracking would not have occurred. It is not known to all workers that a water-hardening steel may be successfully hardened in oil when the tool made from it is in a very thin section, such as the cutter just mentioned. Of course, a tool of any usual type made from water-hardening steel could be successfully hardened in water only. In the case of this cutter, again, successful hardening would be obtained more readily by cutting the discs from a suitable sheet of steel instead of turning them off from a round bar. Even when the cracking difficulty has been overcome there remains the liability of the cutter to warp in the hardening process. One way of overcoming this would be to make a suitable cramp in which to hold the cutter flat while it was being quenched. Probably, however, the most satisfactory and economical thing to do, when circumstances permit it, would be to order the finished cutters direct from people (such as an experienced firm of steel makers who also make Circular Saws) who are in the habit of tackling similar jobs.—"The Edgar Allen News."



# Modernization of Philippine Public Utilities

The Result of Two Decades of American Engineering Tutelage in the Islands

By Frank J. Dolan

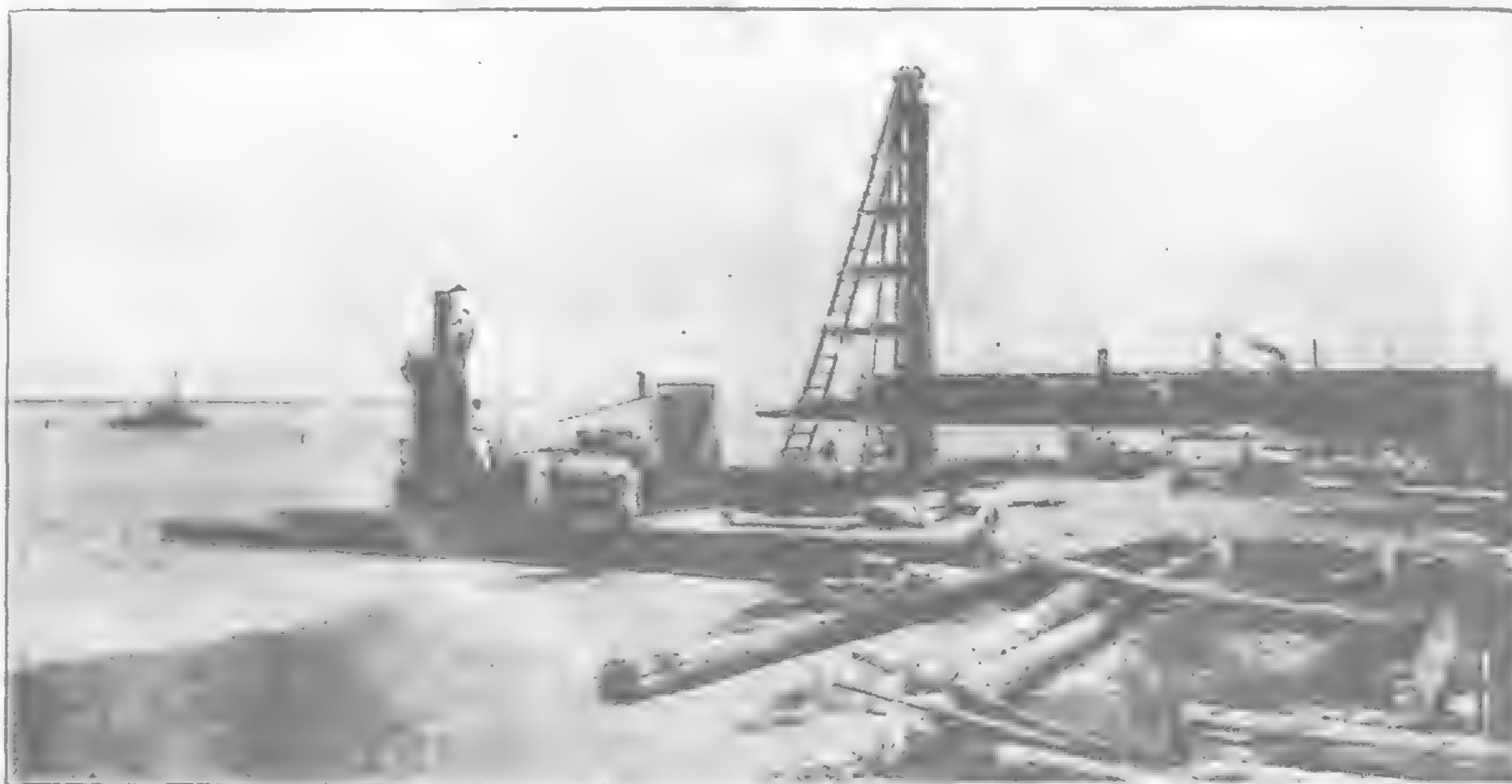
THE Insular Government of the Philippine Islands has been confronted for the past twenty years with one of the most difficult problems in the reconstruction of public utilities that has ever presented itself in any country.

At the beginning of the American occupation the Islands were almost totally devoid of any public service outside the city of Manila, and it must be confessed that Manila itself had little or nothing to boast of. In the year 1900 there was no rail transportation; street car systems had not been thought of; waterworks, artesian wells and sewerage systems were never even considered in the provinces; the only roads were old Spanish highways and a few built by the United States Army, and these were for the most part blazed trails through the hills; some semblance of education was carried on in three old adobe buildings by Spanish missionaries, two of which were in Manila and one in Cebu; telephone and telegraph systems were not even a proposed addition to the lines of communication already established (a spasmodic mail service operated by the constabulary), and the inter-island boats were very few and far between.

This brief résumé conveys some small idea of the huge task set for those destined to place the Philippine Islands on a firm commercial foundation, and the following review of the public utilities will testify to the enormous growth and expan-

sion of the various systems of public service since the early days of the American occupation.

The Philippine Island Telephone and Telegraph Company operates in Manila the most modern and efficient telephone system in the Orient. At the end of the year 1918 the Company had 75,000,000 feet of copper wire in underground cable; 4,500,000 feet of open wire on poles, and 13,000,000 feet of copper wire in aerial cable.



Erection of derrick commenced on the site of Manila's new pier. Pier No. 5 may be seen in the background

Now 8,300 telephones are connected in Manila and the suburban towns, as against 750 in 1906, the year of the present company's organization.

In the cities of Cebu and Illoilo, the two trade centres of the Southern Islands, the old magnetic ringing system was inaugurated a few years ago and is still being used. There are approximately 300 telephones in Cebu and 200 in Illoilo, and in Baguio, in the mountain province, about 75 of the old type are employed. From Manila to Cavite is the longest direct call stretch, a distance of 25 miles.

The Telephone Company's equipment includes two common battery exchanges of the latest type, similar to those now being used in the United States, and two automatic exchanges of the latest approved type. An automatic system is being installed in Manila.

## Telegraphs

The Philippine Insular Government took over the telegraph system in 1906,



Interior view of one of the Manila telephone exchanges, showing both male and female operators at work at the switchboard. One of the most essential qualifications for a position as telephone operator is a knowledge of Spanish, English and Tagalog



which had, up to this time been operated by the Philippine Constabulary and the Signal Corps of the United States army since 1900. In 1906 only 198 miles of cable had been laid and 2,574 miles of telegraph wire strung, but a survey of the present telegraph situation shows a growth that is typical of all the other public utilities.

The Philippines are now wound around with 11,000 miles of overhead wire, and over 2,000 miles of submarine cable. More than 350 telegraph stations are in operation throughout the Islands, and 40 more will be added to this number in 1920. Most of the principal municipalities can now be reached by telegraph.

In addition to the regular telegraph system, ten wireless stations are in daily use, and fifteen more are authorized. The largest of these is operated in Zamboanga, on the Island of Mindanao, and is capable of communicating with Java and Borneo.

### Irrigation

The Irrigation Department of the Bureau of Public Works was created in 1908, and a bill was passed authorizing the annual expenditure of P.750,000 indefinitely. The Division did excellent work, but was abandoned in 1913, due to the necessity for economizing in the expenditures for Public Works.

The department was revived again early in 1918 with an appropriation of P.1,000,000 for the fiscal year. Notwithstanding the fact that this appropriation was cut in half by the legislature in 1919, excellent results have been attained. There are now 25,000 hectares in the Islands properly irrigated, and ten projects recently approved for construction will irrigate an area of 22,000 hectares.

Most of these systems should be completed during the coming year, and will practically double the area now being served by modern irrigation systems. In addition to the systems approved for construction, the Bureau of Public Works has under consideration 40 irrigation projects in 20 of the principal rice producing provinces that will irrigate a total area of about 3,000,000 hectares, and cost about P.50,000,000.

A proposed act is now pending that would make for the clearing up of these projects within a period of ten years. Their construction would increase the annual yield of rice from 6,000 to 10,000 cavans, which would be a solution of the present rice shortage.

### Water Systems

The Bureau of Public Works is carrying on an active program for the construction of municipal waterworks. The Bureau has supplied most of the villages with artesian wells, but the demands for water supply systems are increasing, and as a result of these demands forty systems are now under



Irrigation in Tarlac Province. View of headworks in operation, looking into headworks from canal; gates passing 2.5 second meters.

construction and twenty more have been approved. At present there are only twelve completed systems in the Philippines, but it is estimated that at the end of 1920 over fifty water supply systems will be in operation.

### Railroads

Three railroads, owned and operated by the Government, have a total span of 1225.50 kilometres of rail, 1013.50 of which is laid on the Island of Luzon, 116.50 in Panay, and 95.50 in Cebu.

### Highways and Street Railways

On June 30, 1919, the Highway Commission reported that 9,526 kilometres of modern highways had been completed in the provinces, and 221 kilometers of city streets in Manila.

This is the sum total of all the improved or semi-improved roads and streets in the Philippine Islands, and this figure is shared by three separate and distinct classes of



470-Balayan Primary School, Batangas Province



highways. First class roads are well graded and surfaced, thoroughly drained and constantly maintained. The term "second class roads" is applicable to fairly graded, partially or naturally surfaced highways, and are generally intermittently maintained. Bridges and culverts are usually complete, but, in part, are temporary structures. All traffic routes for



South approach Sabang Bridge, Batangas-Ibaan Road, Batangas Province

carts not included in the first and second class, are third class roads. Such roads are usually narrow and poorly graded, and are generally impassable in the rainy season.

The length of road in the different classes is as follows: first class, 4,328.3 kilometers; second class, 2,034.1 kilometers; third class, 3,163.7 kilometers.

#### Street Railway

The trolley car system of Manila ranks with that of American cities of about the same size as New Orleans. One hundred and twenty-eight street cars are in constant operation, most of them equipped with airbrakes, and the city is interlaced with fifty-five miles of single track.

The Manila Electric Company, owners and operators of the street car system, have installed huge dynamos in the power plant, capable of generating 3,500,000 kilowatt hours a month. These dynamos furnish light for about 289,000 people in and around Manila.

#### School Buildings

There are now fifty high schools and four hundred and four common school buildings in the Philippine Islands, with a total of twenty-three hundred and fifty-six class rooms. Most of the buildings are modern structures and are equipped according to the educational standards of the United States

#### Public Works under Construction

The Jones Bridge, which will span the Pasig River in Manila, is probably the largest individual engineering project now under construction in the Philippines. The bridge was started in the spring of 1917, but owing to the Government's inability to procure steel due to war conditions in the United States, operations were suspended after a few months. But for several months work on its structure has been rapidly progressing, and it is expected to be opened to traffic on July first, 1921, with a final cost of P.1,925,300.

At present, Manila is provided with three medium sized piers, one of which is used exclusively by the United States Army. A fourth pier, approximately 240-ft. in width by 1,000-ft. in length, is now under construction and will be completed during the next year. A fifth pier is also under consideration, and construction operations may commence early in the spring of 1920. More than 1,000 lineal feet of marginal wharf has been constructed, together with numer-

ous marginal cargo sheds. The length of this wharf will likely be trebled during the coming year.

#### Fuel Oil Tanks

Permission to erect fuel oil storage tanks upon the port area at Manila has been granted, and each pier will be piped so that ships burning oil may receive fuel within a very short time after tying up.

#### Interisland Shipping

The improvement of interisland trade during the years of the American occupation can best be illustrated by the following table, which contains a list of the interisland ships entered and cleared at all the ports of the Philippine Islands during the first eleven months of 1919:—

		Entered		Cleared	
		Vessels	Net Tonnage	Vessels	Net Tonnage
Iloilo	... ..	4,868	335,260	4,899	338,426
Cebu	... ..	4,923	334,169	5,053	345,272
Jolo	... ..	111	28,666	111	28,666
Zamboanga	... ..	997	131,763	1,008	135,123
Balabac	... ..	33	2,030	35	2,046
Manila	... ..	3,026	532,547	3,135	532,707

Unlike other countries, where public utility and public service systems have been in operation for generations and where all the ultra-modern facilities for the improvement of these systems are immediately available, the Public Utilities of the Philippines are but twenty "years young"—six thousand miles from its base of supplies.

Notwithstanding this the Filipino people have joined in the march of progress and are firm in their desire and confident in their ability to continue to improve the public utilities of the Philippine Islands and to place them in a firm position on the same plane as corresponding systems in any country in the world.

#### Irving National Bank, New York

Some measure of the recent expansion of the foreign business of the Irving National Bank is afforded by the appointment by the Board of Directors of two vice-presidents, an assistant cashier and four assistant managers all for service in the enlarged Foreign Department. Mr. William N. Enstrom and Mr. George D. Graves are the new vice-presidents and Mr. Northrop Holbrook the assistant cashier, while the added assistant managers are Messrs. Robert W. Kuebl, James C. Bradshaw, George Helfrich and Fritz Hartman.

All of the new officers have been Irving men for some time and their promotions have been earned. Mr. Enstrom, who was born in New York in 1886, entered the Irving's employ soon after finishing high school and except for leave of absence during the war has served continuously in the Foreign Department. He volunteered and was commissioned a naval lieutenant early in the world war and for nearly two years was attached to the American Embassy at Rio de Janeiro, Brazil, as assistant to the Naval Attaché.

Mr. Graves returned to New York in September after six years spent in Porto Rico, first as a resident director and during the last two years as the Irving's representative in the island. He was born in Canada of American parentage, and except for his primary schooling all his education was received in the United States. He was graduated from Yale in 1899, and was admitted to the New York bar the same year. In this ten years of practice in this city, prior to his settling in Porto Rico, he traveled much in Europe and the West Indies in the interest of clients. Mr. Graves will give particular attention to the development of relations with the Irving's Latin American correspondents and customers.

Mr. Holbrook has been chief clerk of the Foreign Department and the other new officers have also been connected with the Department for several years.



# Japan's Burden and China's Opportunity

By George Bronson Rea

"There exist weighty reasons which draw the United States closely to Japan in bonds of mutual protection. The Russian menace is a very live and real one, intensified tenfold by the certainty of its recrudescence under German direction, placing Japan in a most delicate position holding the eastern front for civilization in the depths of Asia. Every sentiment of loyalty, gratitude, wisdom and friendship calls upon us to stand by her, to aid her with moral and material support, for on her shoulders alone will fall the burden of resisting the flood from the west. If the Kolchak government fails, if the thin line of resistance gives way west of the Urals and the red wave of Bolshevism sweeps onward into China who will be called upon to save Asia from ruin? And let us remember that the Bolsheviks are marching eastward, crying "On to China." While we sleep in peace and comparative comfort in the United States safe from the horrors of these old world upheavals, the Japanese are forced to preserve intact their line of defense to oppose the onward march of their natural enemies, and at the same time cope with the secret opposition of a one-sided diplomacy. Put an end to it. Let us wake before it is too late."

The above situation, forecasted in September in "The Breakdown of American Diplomacy in the Far East," is now before the world. The Bolsheviks have taken Omsk, and Irkutsk and are pressing eastwards. From Lake Baikal it is only a step across Mongolia to China, to the Pacific, to Japan. Japan is alarmed, as she well might be, but because of American intervention in Asiatic affairs, her government has been deprived of taking independent action for safeguarding its interests.

The original reasons for Allied cooperation in Siberia have ceased to exist. The situation in Siberia demands readjustment of the relations of the Entente Powers which participated in the original military movement into that country. The purposes of that movement were to aid the Czecho-Slovak forces against the pursuing Bolshevik army. Practically that has been accomplished.

Protection of vast military stores at Vladivostok was another purpose of the Siberian expedition. Most of these stores now have been distributed among Kolchak's forces. A third purpose was the protection of the Siberian railroad, useful only as a link of communication between European Russia and Vladivostok. Now that it has been cut by the Bolsheviks west of Omsk, there is no further necessity for guarding what is left.

As all now apparently have been met, certain elements in Japan are warning their Government that complete American withdrawal from Siberia is to be expected, making necessary an early decision by the Japanese Government as to the course it will pursue.

Japanese newspapers declare that the Bolshevik menace is at Japan's very doors in the northern part of Saghalien, in Korea, and that the germs of the malignant disease are in China. An agitation has set in to meet it by increasing the Japanese army of 30,000 in Siberia, but it is declared that as the expense of such an undertaking, which at best could only insure the safety of that part of Siberia lying eastward of Lake Baikal, would be enormous, Japan would need cooperation by the Entente Powers and especially from the United States if such a policy were adopted.

What is the United States and the Allies going to do about it? Will we falter and fail and persist in blocking Japan and preventing her from checking the tide of Bolshevism and repeat the blunders we have made in Europe? For, to repeat the words of F. H. Simonds, the eminent authority on present European affairs, "the great protest in France to-day against American policy lies in the fact, that America, with perfect impunity as far as she herself is concerned, is arousing animosities and resentments which on the day of judgment will react upon the French, without any certainty that America will be there to help them bear the burden."

Why should America attempt to preserve order on a Siberian railway, which, in its last analysis, is simply another one of the many covert moves to block Japan's influence in that direction, and lay her open to future attack from her old enemies? Everywhere the Japanese turn they encounter American interference, objection and resistance. We have barred them out of the United States, and the Japanese Government has entered into a Gentleman's Agreement with us to meet our wishes. They are not wanted in Hawaii, nor in the Philippines. The Americans object to their presence in Shantung, we tried to deprive them of their fruits of victory in Manchuria by proposing the neutralization of the railways in that zone. We opposed their Demands upon China, we thwarted her attempts to arrive at a settlement with China, we concentrated our diplomacy upon her at Paris, and are now trying to penalize her and make impossible the defense of her empire by insisting upon the pooling of her railway and other concessions in the proposed Consortium, while permitting territories and valuable concessions held by other Powers to be excluded. And from an altruistic concern for the nascent germ of Democracy in Russia, we have opposed and thwarted her in Siberia. By our presence we have acted as a brake on her initiative, creating friction, jealousies, misunderstandings, and prevented thorough action in dealing with the situation that can only be done by an undivided responsibility. As in France, so in Siberia, where, when the storm breaks, and Japan is called upon to preserve herself and China from ruin, there is no certainty that America will be there to help her bear the burden. On the contrary, there is every certainty that we will be conspicuous by our absence. And now, when Japan is face to face with the menace of Bolshevism, what are we going to do?

There are no Japanese officers or men in the Red Army of Lenin. In Japan, alone of all the great nations, Bolshevik doctrines have failed to take root. On the contrary, it is a notorious fact that Lenin's bodyguard and executioners are mainly Chinese. The evidence placed before the Senate Labor Committee showed that the recent Red activities in Gary and elsewhere had their direct inspiration from Moscow and were aimed at the overthrow of the American Government by armed force. There is the same kind of evidence for the existence of a world propaganda. In an address delivered at Moscow, the soviet commissary, Lunacharsky, described the proletariat of China and India as "the natural ally of the soviet republic," and in August last Lenin formally invited the Chinese people to ally themselves with the Bolsheviks, declaring that the "Red" forces were on the way with the gift of "freedom to the people, liberation from foreign bayonets and emancipation from the yoke of foreign gold



which is throttling the enslaved peoples of the east, particularly the great Chinese nation."

Lenin has his own Chinese bodyguard at Moscow, and it is from China that he hopes to draw recruits for the "Red" armies; something more than rumor also credits him with the ambition to use the Orient for the subjugation of the west. Bolshevik Moscow prints a newspaper for circulation in China and carries on Chinese propaganda through a Chinese department headed by Chun Yun-sun. Each envoy sent out by him is instructed to spread through China the statement that Lenin is a reincarnation of Genghis-Khan, come to life again to lead Asia to the conquest of Europe. Portraits of Lenin in Asiatic attire are being distributed broadcast among the Chinese, with the effect, it is said, of convincing the ignorant among them that he is, in truth, "their legendary national hero."

Evidence from the Dutch East Indian Government reveals the existence of a wide-spread Bolshevik conspiracy in Java and other Dutch East Indian colonies under the guise of an anti-Japanese boycott launched by Chinese Bolsheviks. It is urged that the masses of China will reject Bolshevism. There is, however, ample evidence to the contrary. Fundamentally, there is no difference between the Bolshevik creed and the motives which influence most Chinese to don a soldier's uniform and shoulder a rifle. The history of the past several years in China produces overwhelming evidence that the average Chinese soldier enlists not to fight, but to loot, ravage and destroy. The records of the Taiping rebellion and nearly every other armed upheaval that unhappy China has passed through, confirms this finding. If Lenin, or any other leader, guarantees pay, loot, and the full gratification of their baser passions to the Chinese mercenaries, he would not lack a formidable following in that country. It is unwise to take any chances.

The United States and Europe are nearing a "show-down" in their Oriental policy. Japan cannot afford to wait. The Bolsheviks have taken Irkutsk and from that base, China can be laid open to active propaganda and proselytizing, and the seeds of lawlessness planted in the Trans-Baikal, Amursk and Ussuri regions. It is time for America to realize that all we are doing in Siberia is exasperating the Japanese, exposing them to a herculean task of self-defense and generally complicating our international relations without serving any sensible national plan or policy.

It is also time for China to awaken to a realization of her obligations to the rest of the world, and shoulder her share of the responsibilities for the preservation of the peace of Asia. It is unlikely that a European or American army will be sent to the Far East to hold in check the Red Terror surging eastwards from Irkutsk. If China lays down, or opens her doors to the Red Flood, she must not blame Japan for taking adequate steps to preserve law and order. She will look and hope in vain for American sympathy if she is tried and found wanting in this crisis.

## Complicated Coinage in China

There has been considerable talk of currency reform in China, but to date nothing tangible has been done. Recommendations have been made to the Chinese Government by Diplomats and by responsible organizations, and expressions of good intention have come from the Peking Government, but there the matter ends for the moment. An illustration of the extraordinary confusion caused by the multiplicity of taels and dollars current in one locality is given by the Commissioner of Customs at Foochow in his report for 1918. He says the currency confusion there is unique even for Foochow, and illuminates his statement as follows: Prices are reckoned in dollars, which are of every

variety—Mexican, French, Hongkong, Straits, "Yüan Shih-k'ai," and yen, to mention a few of the silver coins. There are also paper dollars, but as these are only current in Foochow itself and are not accepted by the tea dealers, there is no need to enter into their intricacies.

The silver dollar, as soon as it appears on the market, is chopped by each money shop or firm through whose hands it passes. A clean, unchopped dollar is looked upon askance. The chop affixed may consist merely of an ink stamp, which does no damage to the coin, or may consist of the money shop's or firm's name—a form of guarantee—being stamped in by means of a sharp die, which actually defaces the coin.

A properly guaranteed dollar assumes a cup shape, not infrequently with a hole through the centre. Silversmiths levy toll by scooping out some of the silver. A clean dollar, once it escapes into circulation, comes back unrecognisable. Banks keep accounts in chopped dollars, but clean dollars may be bought and sold at differential rates.

The local currency, however, is not the dollar. There are two tael weights, of which the accepted standard is the Hsin-i-p'ing tael. 100 chopped dollars are represented, nominally, by 74.16 Hsin-i-p'ing taels. There is no official guarantee that the scales in use do not differ. 100 dollars, not over-chopped, if paid into a bank account, will generally be accepted by count, larger sums by weight; but a cheque drawn for similar amounts may realize the amount it is drawn for by count, may have an enforced 1 per cent. discount inflicted to cover good dollars issued, or may realize 102 or 103 or more pieces of silver, which may consist of some good dollars, some badly chopped dollars—which, however, may still pass for face value—and an assortment of what were once dollars but are now useless for any other purpose but to resell for their weight, attached to which transaction there is a gain or a loss, depending on the qualifications of the individual disposing of them.

The weights used for receiving and for paying out differ in some instances, the weight for receiving being Hsin-i-p'ing Tls. 74.16 and for paying a weight called a Yangp'ing tael, which is reckoned at 71.7 for each 100 dollars. Yangp'ing Tls. 100, however, equal Hsin-i-p'ing Tls. 103.3, so that the actual rate at which a depositor receives back his money is Hsin-i-p'ing Tls. 74.066. A depositor who cares to make the experiment may get rid of his capital if he takes the trouble to pay it in and draw it out a sufficient number of times. This is roughly the position of the Foochow silver currency. The rate of exchange between Foochow and Hongkong fluctuates. There may be a discount, or, at another time, the Foochow chopped dollar may reach an 8 per cent. premium against the clean Hongkong currency. In other words, 92 clean Hongkong dollars, duly passed through the chopping process at Foochow, become equal to 100 clean dollars at Hongkong. The rate of discount of local dollars on Shanghai varies between 1 and 4 per cent. The average Shanghai tael selling rates quoted for the past four years were: 1915, 71.48; 1916, 70.49; 1917, 71.35; 1918, 71.73.

Sufficient has been said to show that trade has to work under extraordinary conditions at Foochow, of which not the least extraordinary is the currency question. What is more extraordinary than all is that it has been submitted to for all these years. The remedy is simple, but it needs courage to face the vested interests. The first and necessary step would be a Government prohibition against defacing and destroying the dollars by chopping, the only chop admitted being the ink impression. The next step would be for the banks and public institutions to refuse all coins after a certain date which were in any way illegally defaced. Concurrently with this should come the abolition of the absurd currency by weight of coined silver. If weight by silver is a necessity for certain transactions, then it would certainly offer no difficulties to adopt one standard tael for Foochow which would admit of both tael and dollar accounts being kept. Present banking accounts in dollars could be adjusted by converting them into tael accounts, which would be in a fixed ratio to the clean Foochow dollar. The clearing of the market of the chopped dollar and the introduction of the clean dollar would have to be a matter of arrangement between the Government and the banks. Such is the situation at Foochow. It lies within the power of the Government and the mercantile and banking interests to bring the district back to the first rank or to leave it as a third-rate market.



# The Future of Agriculture in China

By C. Y. C.

1. *China as an Agricultural Country.*—With the extensive stretches of cultivable land and its vast population China has been for the last forty centuries and will be for ages to come essentially an agricultural nation. The natural fertility of the soil, the temperate climate, and the abundance of cheap but efficient labor enable her to produce raw materials in large quantities and at a lower cost than other nations. A glance at the statistical data published in the Customs reports will show that a large proportion of native exports consists of agricultural products. It may be summed up as follows:—

	1913 Tls.	1916 Tls.
Total export ... ..	403,000,000	482,000,000
Agricultural products ... ..	332,000,000	352,000,000
Non-agricultural products ...	71,000,000	139,000,000
Percentage agricultural products	82%	73%



A Rice Mill in Chekiang Province. The huge wheel is of stone and crushes the grain as it revolves in the stone-lined trough, a bullock supplying the power

The high percentage of raw materials to the total export is maintained in spite of the very difficult accessibility of the interior provinces, the inadequate transportation facilities in others, the unnatural barriers placed upon the transit of goods (such as the *likin* duty and the embargo on rice, etc.) and the unsettled condition of the country which hampers the productive power of the nation. The completion of the Peking-Hankow line raised the export trade of Hankow from Tls. 7,140,000 in 1904 to Tls. 17,830,000 in 1909 and the extension of the Peking-Kalgan Line into Northern Shansi brought an increase of several millions in the export trade of Tientsin during a single year. Besides, there is plenty of other evidence to show the latent possibilities of the agricultural produce of the country if proper stimulation can be provided along the line of government protection and encouragement and of improvement in transportation facilities. The land is there, the labor is there, and in many localities the ready product is there, waiting for an outlet.

The Szechuan and Shansi regions belong to this category, while pioneer work is necessary in opening up the outlying regions, such as Mongolia, Chinese Turkestan and Tibet. On the other hand, in spite of the efforts on the part of the Government and the people to promote industry, there has been little actual progress made; and from the very nature of the country and its people, such progress will be necessarily slow. The successful enterprises of the great industrial countries were not built up in a day and the necessary knowledge, experience, and capitalistic co-operation were only acquired through a long process of self-evolution. So, after a period of about three decades of all kinds of talk in China about industrial advancement, the sum-total of the result is just possibly about that of one industrial city, say, in the United States. China is and will be for some time to come essentially an agricultural nation, though she possesses the potentialities for great industrial development.

2. *Agriculture and National Finance in China.*—The state of national finance of China is daily becoming more stringent. The nation's liability has increased by leaps and bounds ever since the unfortunate war with Japan. Up to 1917, the total foreign obligations amounted to \$2,971,000,000, or about three billions, two-thirds of which is represented by non-productive expenditures necessitating a yearly payment of about a hundred million dollars for interest alone. Further reckless borrowing has been indulged in since that time. In addition to this, the Customs returns have shown an unfavorable balance of trade year after year. The following figures will give us an idea of how much this item amounted to during the last ten years:—

Year.	Import.	Export.
1908 ... .. Tls.	394,505,478	Tls. 276,660,403
1909 ... ..	418,158,067	338,992,814
1910 ... ..	462,964,894	380,833,328
1911 ... ..	471,503,948	377,338,166
1912 ... ..	473,097,031	370,520,403
1913 ... ..	570,162,557	403,305,546
1914 ... ..	569,241,382	356,226,629
1915 ... ..	454,475,719	418,861,164
1916 ... ..	519,406,995	481,797,366
1917 ... ..	549,518,774	462,931,630
Total ... .. Tls.	4,883,034,845	Tls. 3,867,467,449

Unfavorable balance during 10 years Tls. 1,015,567,396  
Even if, according to general economic principles, the unfavorable balance of trade is not necessarily unfavorable to a country, it is undoubtedly unfavorable as far as China is concerned. The remittances from the five million Chinese residing abroad are more than counter-balanced by the money



remitted back to their own country by the foreigners and the freight charges which have to be paid to foreign ship-owners. With the heavy liabilities of the Government and financial troubles throughout the country, the only alternative to bankruptcy is an increase in the export of produce. In the near future at least, such increase of exports cannot be expected of manufactured goods. Only in the agricultural field can we reasonably hope for a rapid rise.

Generally speaking, the burden of taxation ultimately falls upon the tillers of the soil. Especially is this true of China. For thousands of years, the farmers have contributed to the maintenance of the Governmental super-structures, forming the backbone of the country. A rough estimate of the Chinese population at the present day easily places the farming elements as representing 80 to 90 per cent. of the grand total. They are certainly the most important if not the most influential class of people. If the financial regeneration of China is to be accomplished in the near future, agriculture will undoubtedly be the principal source of the nation's wealth.

### 3. *The Present Conditions and most Desirable Reforms.*

—In spite of the extensive area capable of production and almost unlimited supply of cheap labor, China cannot be said to be half developed even agriculturally. Intensive farming is only practiced in the thickly populated regions along the sea-coast and in places where nature provides for easy and ready means of transportation. In the interior provinces, lands are cultivated to the extent of providing for the necessities of the local residents in the more or less limited district. While in the out-lying regions, vast tracts of fertile land remain in the state of virgin wilderness. Besides, there are still large areas to be found even in the so-called populous provinces such as Kiangsu, Anhui, etc., which have either been abandoned or remain fallow on account of lack of protection from lawlessness or too frequent floods. Even in those intensively cultivated areas, there is always room for further improvement. The Government has done little or nothing to ameliorate the situation, but has, on the contrary, caused devastation in a number of the localities by its military campaigns, or hindered the natural development by unwise legislation. The industrial promoters, on the other hand, have paid little attention to these rural interests. Nevertheless, a far-sighted policy for the future welfare of China will inevitably give prominence to a thorough going scheme of agricultural reformation. Such a scheme will involve two distinct branches of work, *i.e.*, the direct and indirect reforms. To investigate the climatic and soil conditions, to try out and introduce improved methods and implements of cultivation, and to devise means of improving the quality and quantity of production are reforms directly concerning agriculture in its technical sense; while the indirect reforms will include a revision of the tax system, abolition of *likin* duty, the accordancy of better protection to the farmers, and provision for better facilities for transportation, communication, and irrigation, as well as financing (such as an adequate agricultural credit system). In fact, most of the administrative reforms which the country is clamoring for and greatly in need of have far-reaching influence upon agriculture in general. The scope, however, is so wide that even a general discussion is out of place in the limited space of the present treatise. The following statement is made to set forth a program of desirable reforms in the direct sense.

First of all, a system of agricultural associations should be established—similar to the educational associations now in existence. With central head-quarters in Peking, branch associations should be instituted in every province with expert agents distributed in every district or "Hsien." The association should be wholly independent, and free from political interference, but the Government should contribute

to the maintenance of the central head-quarters, and the provinces to that of the branch associations, while each district should be held responsible for the cost of keeping one expert agent and his office. Supported in this way, the burden of the necessary expenses should not be very heavy upon any one source, and it provides for a course of gradual development. The work of the association may be conveniently outlined as consisting of three distinct steps: (1) investigation into the local conditions and collection of the necessary data, (2) devising means of possible improvements and plans to carry them out, (3) to conduct short courses of simple agricultural training, lecture tours, exhibits and fairs in order gradually to interest the farmers in the new ideas and convince them of their practicability. In order to know how to improve, one must be thoroughly conversant with the actual conditions which vary widely in different places, hence the necessity of detailed investigation. After securing the necessary data, it is up to the experts of the association to determine how and where improvements are mostly needed and test them out if required. In this connection, the association should take upon itself the task of urging the various administrative reforms which would be of benefit to the farmers. As a last step, the appeal is made to the farmers themselves by showing them what they could do to make a better living. The district expert is the one that comes into direct contact with the people and should be specially trained not only in the technical sense but also in how to approach and associate with the farmers in order to be able to exert the greatest influence. It is really a kind of missionary work. With such an organization properly instituted and working hand in hand with the Ministry of Agriculture and Commerce, the agricultural schools and experiment stations as well as with the educational associations, rapid progress among the farming population might be expected. A substantial increase of the farm produce will be one of the most dependable means of saving the nation from possible bankruptcy.

### More Liners on the Pacific

That a number of passenger liners will be placed on the run between Seattle and China and Japan is indicated in a report made by John H. Rosseter, former director of the United States Shipping Board. He recommends that the Shipping Board proceed at once with the construction of seventy high class cargo liners and ten smaller passenger vessels. He favors having private companies build and operate large, first-class passenger ships.

In his report to the board, Mr. Rosseter recommends strongly against permitting any of the former German vessels being retained by the War Department as transports. Mr. Rosseter would use these craft for passenger liners.

The Shipping Board has made good its pledge to construct 6,000,000 tons of shipping in the year 1919, it is announced by John B. Payne, chairman of the board. By December 31 the board delivered 6,000,000 deadweight tons of shipping. On December 1 it had completed, in 1919, 5,818,500 deadweight tons as follows: Steel 4,472,000; wood 1,298,000; composite (steel and wood) 42,000; and concrete 6,500.

The actual construction program on December 1 showed 2,314 vessels of which 2,240 had keels laid, with a tonnage of 12,926,486 deadweight. There were 1,910 ships of that number launched with a deadweight tonnage of 10,494,047 of which 1,674 vessels had been delivered up to December 2.

In a statement issued by the Shipping Board it says: "Within the last week the Pacific Coast needs for more ships for the Orient were called to our attention by a delegation. We are now caring for the cargo movement and expect steadily to increase our fleet there. The crying need for passenger vessels, which we realize, and which was again called to our attention by the delegation, we regret we cannot fill until the summer of 1920, when the construction of our passenger ships is expected to be completed."



## New Building for the Hongkong and Shanghai Bank

**W**ORK will be started in Shanghai shortly on the new Hongkong and Shanghai Banking Corporation building which is to cover an area of 62,000 square feet from the Custom House to Foochow Road and will extend from The Bund to Szechuen Road. The structure will be completed in two years at a cost estimated at Tls. 2,000,000. The land which it will occupy is valued at Tls. 2,500,000.

The new premises will be erected on the site now occupied by the Hongkong Bank, the old Kelly and Walsh Building and Messrs. Thomas Simmons and Company offices and will extend along Foochow Road to the building owned by Messrs. Caldbeck, Macgregor & Company.

The new building will consist of five storeys and is designed in a quadrangular form with an internal open space above the Banking hall. It will be one of the largest structures in the Far East. When it is realized that the roof alone will be as high as the Customs tower, some idea of the grandeur of the undertaking may be formed. The commanding situation and setting of the building will lend magnificence to the structure, the site itself giving an opportunity seldom offered to the designers: it will conform in its proportions to the situation where it will be seen by the mercantile fleets of the world. Isolated from any other structure, the building will have a facade of 300-ft., facing the river, and a return frontage on Foochow Road of 220-ft., and will be surrounded by a raised Rodium on which will be placed statuary and vases for shrubs. Frontage will also be obtained on Szechuen Road. While alterations will doubtless be made to the design given here, the general effect will be very much the same. Sculpture on the fronts will represent Industry, Labour, Agriculture, Time, Justice and the Arts.

The principal entrance to the Bank, from the Bund, will be formed of heavily rusticated arches surmounted by a Corinthian order of columns, which with the storey and balustrade above will reach the height of 110-ft., and this height will prevail all the way round the frontage and return.

All the facades will be built of Hongkong granite, noted for its bright cream color and texture, and the crowning feature of the structure will be the copper-covered and enriched dome over the grand entrance. This will reach to a height of 162-ft. and will terminate in a lantern, the diameter of the

dome being 56-ft. A bright band of color will be formed in a golden mosaic at the base of the dome, 10-ft. wide.

The first impression of the spacious interiors will be gained on entering the vestibule from the outer portico, the dimensions of which are 65-ft. long by 20-ft. wide. The walls will be of Hongkong granite, and the three massive arches will be filled with bronze gates, the entrance doors being of the same metal. Above will be stained glass windows in heraldic designs. The vestibule, forming part of the public space, will be 65-ft. wide and 28-ft. high, the walls will be of Brescia or other selected marble and the ceiling will be enriched with modelled plaster work. All the doors and joinery will be of walnut enriched with inlay work.

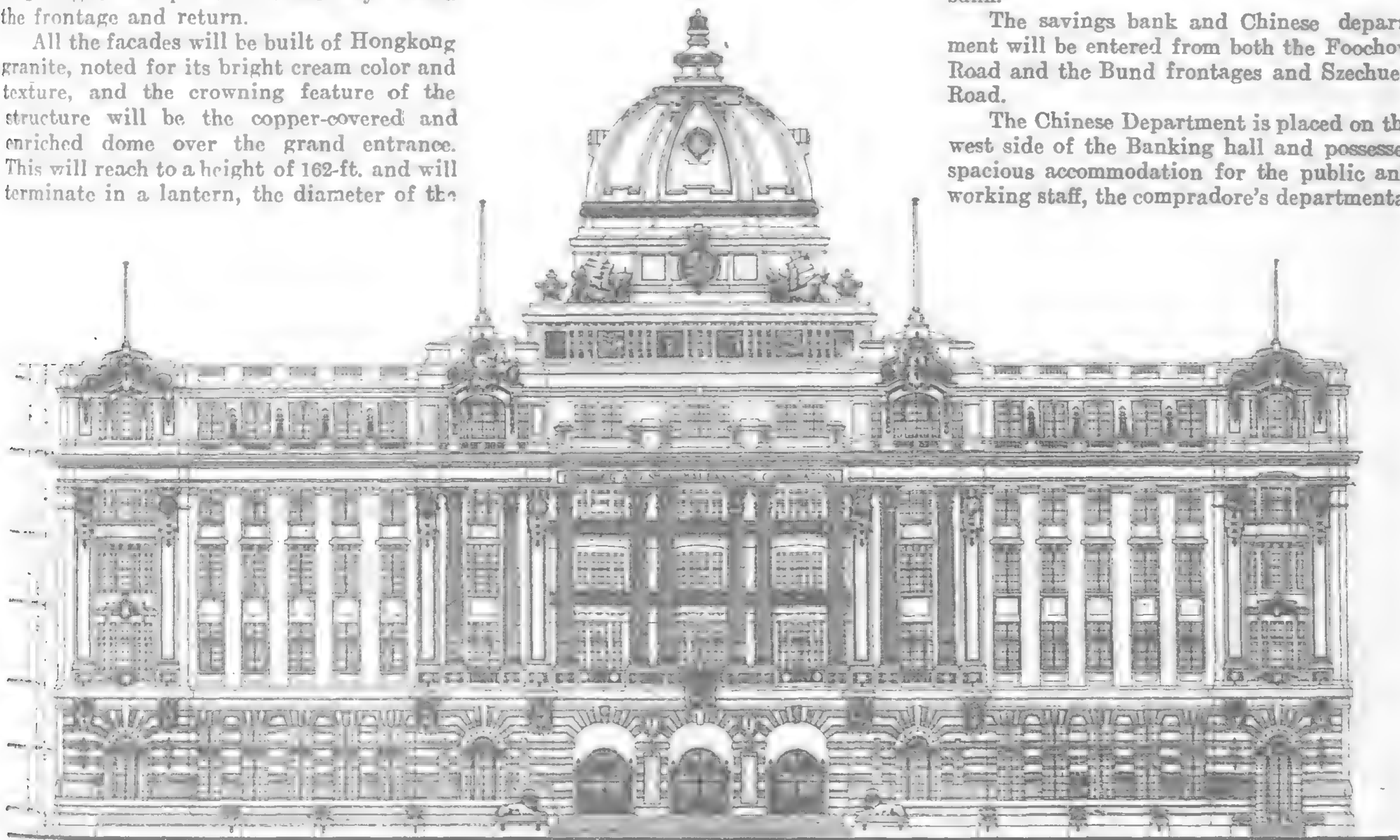
The banking hall, occupying an area of 21,500 square feet will have its ceiling supported on 40 columns covered with marble, the ceilings will be coffered, and the hall will contain the latest and most practical features of modern banks suitably arranged for the climate.

The fenestration of the hall will be such as to secure excellent light from three sides, with a barrel-vaulted roof of reinforced concrete with glazed lighting spaces, and arrangements for killing any glare from the sun. At either end of the vaulted roof will be painted and modelled panels representing Agriculture and Commerce.

The public space for the transaction of business will be 60-ft. by 20-ft. connecting directly with all departments with two entrances from Foochow Road and one from Szechuen Road. Marble counters with grilles and departmental signs will be installed, the walls will be of marble and tiles of approved texture and color, while a feature of the hall will be the marble bridge connecting the tiffin and changing rooms on the mezzanine floor. Contiguous to the vestibule will be the brokers' waiting room and the private office, both of which will have direct communication with the manager's office, beyond which will be some of the departmental offices of the bank.

The savings bank and Chinese department will be entered from both the Foochow Road and the Bund frontages and Szechuen Road.

The Chinese Department is placed on the west side of the Banking hall and possesses spacious accommodation for the public and working staff, the compradore's departmental



Front Elevation of the New Building for the Hongkong and Shanghai Bank, Shanghai



offices having direct road frontages on Foochow Road and connecting directly with the Chinese portion. Tiffin rooms, changing rooms, ample lavatory accommodation and a shroffs' dining-room will adjoin their department. The treasuries and book rooms are spacious and will be constructed with observation corridors round them, the outer walls of which will be of reinforced concrete having special lattice bars in the formation of same. The walls of the treasuries proper will be of reinforced concrete and be made proof against interference and intrusion by the adoption of the latest approved materials—ventilating and fire resisting appliances.

Situated on the upper floor are suites of offices and access to these may be had from four stairways for use of the public. The wall of the stairway will be lined with grey tiles. Six lifts will carry the public to any of the offices they desire to visit. In addition to these lifts service elevators will be installed, with special coolie stairways adjoining, to connect with all floors for distributing the daily chits and other articles. These service stairways will all have sanitary angles and be supervised and controlled by watchmen. Space will be provided for the storage of cycles, and rooms will also be provided for the use of coolies only on every floor with modern lavatory accommodation. Garages and ricscha sheds will be provided so that they can be entered from the two wide private roads connected to the Bund and Foochow Road and Szechuen Road and connecting directly with public and private entrances.

The chief accountant's office, security and coupon rooms are on the right of the Bund vestibule. Private rooms for the Bank's customers will be provided. The floors to the administration portion of the building will be of selected oak, and the public spaces and corridors of mosaic with all sanitary angles and corners. The ornament generally will be appropriate, straightforward and refined. White shutters will be provided to all the windows having sunny aspects so that the steel and bronze windows will open out fully to attract any breezes going: ample extract fans and ducts will be provided in addition to the natural ventilation.

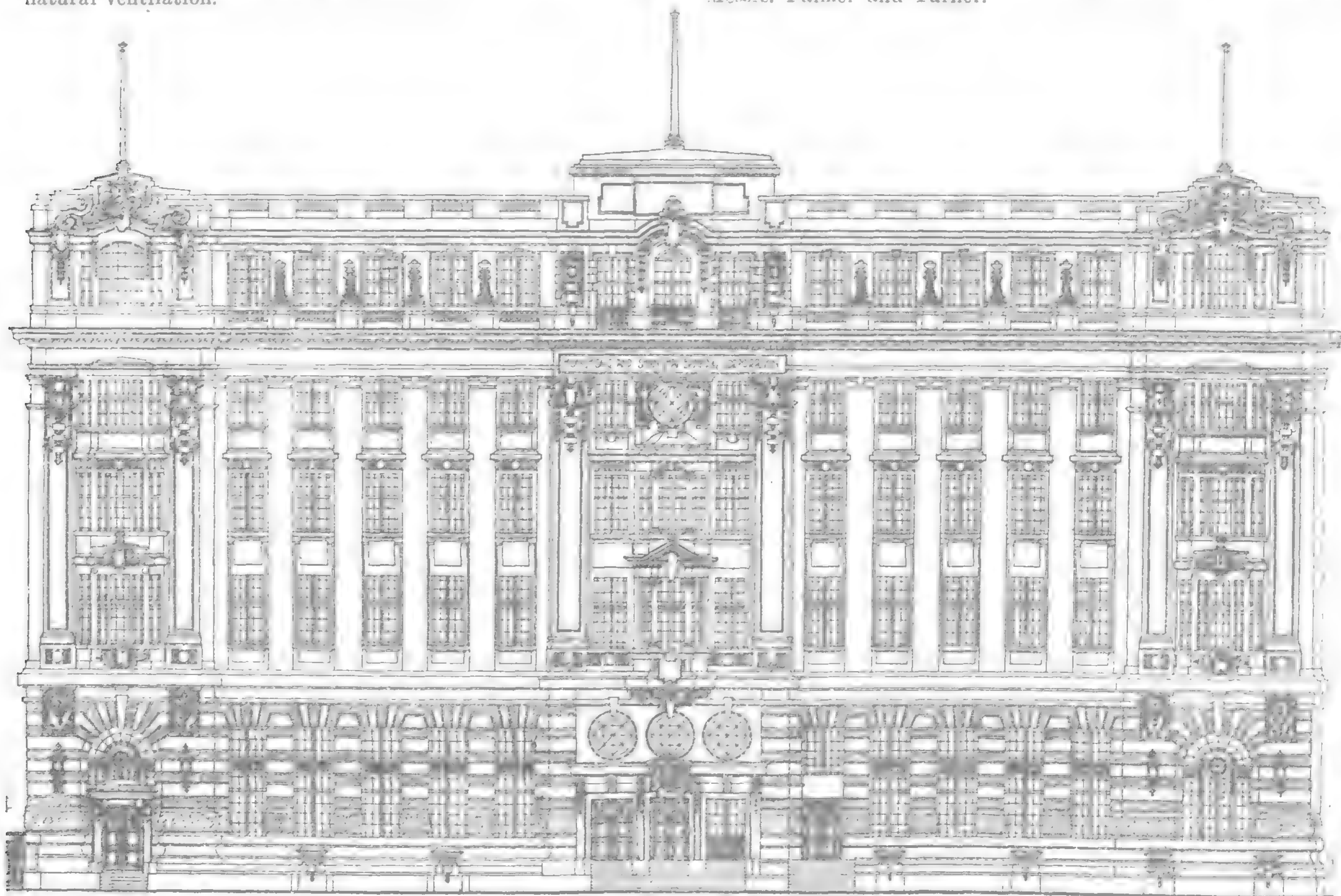
On the third floor the manager's flat will be arranged, all self-contained with its own private staircase, and lift, and fire exits. The private entrance hall to the residence connects also with the administrative part of the Bank. The suite of residential rooms will consist of a salon, large dining-room with large verandah, 70-ft. by 20-ft. and in addition a sun room with verandah garden adjoining. Service rooms will be in connection with the dining and reception rooms and a private office with telephone in connection with the entrance.

On the floor above, eight bedrooms, boudoirs, all with bath-rooms and sleeping rooms will be at the back of the building where they will have their own open air space with covered ways all round and rooms and lavatories and kitchens *en suite*. The servants will thus be isolated and a bridge will connect their quarters to the domestic service department.

The windows throughout the building will be of steel and those to the ground floor bronze all glazed with polished plate glass or selected braided glass. The locks will have bronze fittings of the most substantial description and be all answering to a master key for each department but the whole of the locks will be controlled by one grand master key. The sanitary arrangements will be the most up-to-date, every lavatory being cut off from the offices and separately ventilated.

The roofs are flat with an isolated chamber below ventilated and cooled by introducing cold currents of air into the chamber so that the building will not feel the effect of the sun's rays on the roof garden. The whole of the external stonework will be in Hongkong granite which has a pleasing color and texture. The whole of the work will be carried out in fire-resisting materials chiefly reinforced concrete but in the weightier portions of the structure will be of steel frame construction.

In the building of the structure the latest derrick cranes with 50-ft. steel lattice jibs will be used with all the latest hoists. By this arrangement stone up to 10 tons can be picked up from the road frontage to proceed in their position on the building. The architects responsible for this imposing building are Messrs. Palmer and Turner.



Elevation on Foochow Road of the Hongkong and Shanghai Bank Building, Shanghai





The Engines for the s.s. "Henrik"

The engines with which the s.s. *Henrik* is equipped are triple expansion surface condensing engines indicating about 1,100 horse power. The engines, boilers, and most of the auxiliary machinery were built by the New Engineering and Shipbuilding Works at their Yangtszepoo Works, Shanghai.



The s.s. "Henrik" before Launching

The s.s. *Henrik* was launched last month at the Yangtszepoo Works of the New Engineering and Shipbuilding Works, Shanghai. She has a deadweight carrying capacity of 2,050 tons. Her length overall is 254ft. 6in.; beam 37ft., and moulded depth 11ft.

## The Min River Conservancy

In his report on Foochow for 1918 the Commissioner of Customs says: The Min River Conservancy scheme has been adopted by the local mercantile interests and has received the assent of the Chinese Government and of the Diplomatic Body. The total estimated expenditure of \$900,000 is to be covered by a loan which will be served and secured by a conservancy tax of 5 per cent. on all dues and duties paid at the Maritime and Native Customs, which includes goods which have paid duty elsewhere on entry into China and are exempted from further duty payment at Foochow. Steamers over 500 tons, ascending the river to Foochow itself, pay a tax of 5 cents a ton, while vessels of under 500 tons pay 3 cents a ton. There is also a tonnage tax on all sea-going junks ascending the river above a certain point, as well as a fixed tax of \$5 a month on passenger launches. A cargo-boat pays a tax of \$1 a month; treasure pays  $\frac{1}{2}$  per mille *ad. valorem*. The Chinese Government Salt Bureau is to pay an annual contribution, the amount of which, however, has not yet been fixed. The actual local government contribution is \$18,000 a year. It is estimated that the annual income to be derived from taxes and contributions will not be less than \$90,000. The work is to be completed within three years from commencement, although it is believed that actual results will be apparent considerably before this. The collection of the taxes and the financial transactions are vested in the Commissioner of Customs. The actual administration will be in the hands of a committee of three, a Chinese Government representative, a representative of the local Consular Body, and the Commissioner of Customs. The object is to admit of coasting steamers of 16 to 17-ft. draft ascending the river right up to Foochow, thus avoiding the double transshipment at present necessary. The harbor space at Foochow is ample and can even be increased, if necessary, by an extension of the present limits. The construction of wharves will have to follow as a natural course as soon as visible results are attained, but in this the shipping companies will have to study their own convenience. The proper lighting of the river will have to be undertaken as the work proceeds. In one respect, at least, Foochow can claim to be ahead of other ports and to be congratulated: the scheme only took six months after its adoption locally to pass through the customary diplomatic channels and receive official sanction. The usual length of time, judged by other places that have undertaken conservancy work, may be measured by years.

Early in January a new weekly paper appeared in Shanghai under the title of "China and Far East Finance and Commerce." The subscription per annum is put down at Tls. 20 equivalent approximately to Mexican \$26. For this the proprietors of the new paper claim to be able to give adequate value weekly. The first issue of the paper is of good appearance, and contains a quantity of commercial articles, market reports, financial and shipping information. Its sphere of usefulness will no doubt develop as soon as the editors have got over the unquestioned difficulties of starting a new journalistic enterprise. We believe that the enterprise of the editors will enable them to fill a want of this country. We wish them the fullest meed of success.

The Rt. Hon. Sir John Jordan, P.C., G.C.I.E., K.C.B., K.C.M.G., H. M. Minister at Peking, has booked to leave China for good by the str. *Cashmere*, leaving Shanghai early in March.

The largest and most powerful wireless station on the Pacific coast commanding sufficient power to communicate with the Hawaiian islands, Arctic Alaska and probably the Orient will be in operation early this year at Keyport, Washington, across Puget Sound from Seattle. The station, towering 400-ft. in height, was ordered built by the United States Bureau of Yards and Docks of the navy. The station will be completed within 180 days. The structure will be of steel ninety feet in diameter at its base and five feet at the apex of the 400-ft tower.



## Railway Bridge Floors

It is of interest to engineers in China to note that the tendency of American engineers to use longer panel lengths for railway bridges continues to increase. The latest example is that of a double track bridge of 430-ft. span, consisting of 10 panels of 43-ft. The editorial in the latest number of the "Engineering News Record" comments with regard to this type of construction as follows:—Long paneling as used in the Coal Valley bridge of the Monongahela Southern Railroad Company, is in harmony with progressive views in modern railroad-bridge design. The reason for using 43-ft. panels is that the truss is improved by simplification. This means reduction of secondaries and reduction of field connections, two important advantages. They may be gained at the cost of some added metal, but there is at least one auxiliary advantage that helps to counterbalance the loss. The mere increase in weight of the floor is an advantage, by no means negligible, as it produces a solidity very favorable to the suppression of live-load impacts. Since experience has shown plate girders to possess a higher degree of reliability and reserve of strength than is credited to trusses, ultimate economy, doubtless, is on the side of long panels as compared with short panels, even though weight comparison of design may point the other way. On this account it is not impossible, we think, that the same reasons which argue for a moderate increase in panel lengths would also hold for the use of much longer panels, which would involve going to bridge proportions of quite unusual kind. Useful results in this direction, however, are more likely to be reached by progressive development than by a single radical step away from recognized practice. This bridge was designed under the supervision of the Chief Engineer of the Railroad Company and was fabricated and erected by the American Bridge Company.

profoundly affect costs. Yet in the hands of those familiar with the conditions surrounding the construction of the railways in question and expert in making allowances for differences, a unit cost per kilometre of line is very enlightening and useful, and to the most casual reader such an average cost obviously discloses the relative burden upon each line which must be discharged before it becomes a commercial success.

It has been almost universal experience that during the first few years in which a railway is open for traffic, it will fall short of earning a normal return. The resulting deficit may be made up in a variety of ways, but in effect it adds to the sum upon which the annual return must be earned. Not infrequently the disparity between net revenues and interest charges is so great during these first years, that interest upon the accumulated deficit mounts faster than revenues from increasing traffic. An ordinary commercial enterprise under such conditions could die a natural death through bankruptcy proceedings. But a government enterprise, in theory at least, is immortal, and the losing race between revenues, and interest charges, in theory, goes on forever, with the gap between them ever widening. It is therefore a subject requiring the highest order of specialized ability to decide, even after the route of a line has been determined, how much can be invested in it. In the case of a line already in operation the program for extension and improvement in some instances may turn upon the same considerations. For this reason, this table of Investment Assets is one of leading importance.

It is worthy of note that the two relatively most unprofitable lines head the list. It may be argued that these are short lines, and for that reason are unprofitable. The point is well taken but emphasizes all the more the low limit which must be imposed on the investment in short lines.

In comparisons like the above, it must be remembered that the character of the construction and the efficiency of the engineering are not the only factors determining the cost of construction. Chinese Railways have been built largely from funds secured abroad. The rate of exchange by which these foreign monies were converted into Chinese currency, obviously has an important effect. The bearing of exchange upon a program of construction must therefore not be overlooked.

## Investment Assets of Chinese Government Railways

The table below gives the Investment Assets or book value of the property of the Chinese Government Railways. Investments assets include (1) Cost of Road and Equipments, (2) Cost of other Physical Property, and (3) Cost of Non-physical Assets. Other Physical Property refers to property such as land, mills or mines not a part of the operated railways, but which have been paid for out of the sums represented by mortgage bonds. Government investment, and similar capital liabilities. Non-physical Assets consist of stock and bonds of other companies, the purchase price of rights, and similar intangible property. The total of these three groups is the sum upon which a normal annual return must be earned before the property as a business undertaking can be said to have attained the condition of a profit bearing enterprise.

The total cost of Chinese Government railways listed herein, on December 31, 1918, as compiled from the reports of the lines, was \$428,401,534.31. From this it appears that the railroads of this country show an average cost of \$78,275.19<sup>(1)</sup> per kilometre of line, or \$125,971.39 per mile. This is an increase of \$2,761.06 per kilometre of line during the year. Much of this is due to the purchase of National Bonds during the year, but much also is due to the constant addition and betterment which must be made to going concerns. Every line shared in this increase.

Railroad properties are usually of such magnitude, composed of such a variety of parts, and constructed under such dissimilar conditions, that a mere statement of cost conveys little to the mind. It is essential, therefore, that such costs should be expressed in the terms of a known unit of some kind. Length of line is the only kind of unit which has been attempted, but manifestly it is very crude. In the nature of things it makes no allowance for amount or character of excavation or embankment necessary, the length or character of bridges in place, the number, size, or material of buildings, and many other matters which

INVESTMENT ASSETS OF CHINESE GOVERNMENT RAILWAYS.

Name of Line	Kilometres Owned	Total Capital Investment	Cost per Kilometre
Peking-Hankow ... ..	1,305.671	\$102,665,955.53	\$78,630.80
Peking-Mukden ... ..	986.650	69,771,530.14	70,715.53
Tientsin-Pukow ... ..	1,106.840	101,437,711.31	91,646.23
Shanghai-Nanking ... ..	327.098	30,711,074.71	93,889.52
Shanghai-Hangchow-Ningpo ...	296.398	22,125,378.23	77,253.96
Peking-Suiyuan ... ..	490.493	28,956,593.91	59,035.69
Cheng-Tai ... ..	242.950	22,137,524.75	91,119.92
Taokow-Chinghua ... ..	152.453	7,377,934.47	48,395.14
Kaifeng-Honan ... ..	185.000	13,558,555.70	73,289.49
Kirin-Changchun ... ..	127.669	6,616,317.76	51,824.00
Shanghai-Pinghsiang ... ..	90.500	4,813,836.22	53,191.56
Canton-Kowloon ... ..	143.296	15,585,379.13	108,763.53
Canton-Samshui ... ..	(Not reported)	—	—
Changchow-Amoy ... ..	28,000	2,643,632.45	94,415.44
	5,473.018	\$428,401,534.31	\$78,275.19

As was pointed out more fully in last issue of this paper the net operating revenues during 1918 amounted to \$43,329,537.83, and the surplus for the year \$33,505,119.57. This revenue was earned by the carriage of 25,475,379 passengers and 18,551,684 tons, being an increase over 1917 of 41,801 passengers and 1,815,050 tons of freight.

(1)	Country	Capital per kilometre of line	Country	Capital per kilometre of line
	Australia ... ..	...G.\$34,243	South Africa ... ..	...\$30,153
	India ... ..	...28,796	Germany ... ..	...74,595
	Japan ... ..	...55,074	United States ... ..	...40,986
	Russia ... ..	...54,939		



Commercial Organizations Registered in the Philippine Islands during the Year 1919.

	Number	Capital Stock.	Capital Subscribed.
Extractive Industries	59	P.5,013,800	P.2,446,750
Agriculture	46	3,329,800	2,033,000
Fishing (fish)	1	40,000	21,750
Fishing (pearls)	1	24,000	15,000
Livestock	3	310,000	68,500
Lumbering	6	790,000	201,700
Mining	2	520,000	106,000
Commerce	90	22,560,300	6,658,624
Automobiles, dealers in	1	1,000	500
Building and loan associations	2	35,000	20,100
Commission and brokerage	1	10,000	2,070
Dry goods	1	400,000	400,000
Film exchange	1	30,000	12,575
General merchants	51	10,688,500	4,555,939
Grocery and drug stores	4	120,000	93,210
Hotel and restaurants	1	175,000	35,100
Importers and exporters	6	990,000	170,000
Machinery merchants	2	850,000	225,000
Paper merchants	1	200,000	49,400
Real and personal property dealers	1	10,000	10,800
Shoe merchants	1	250,000	75,000
Tobacco merchants	2	525,000	316,000
Transportation companies	14	10,775,000	592,930
Warehouses	1	500,000	100,000
General Manufacturers	46	10,921,104	4,169,264
Aerated water	1	2,000	2,000
Distilleries	1	22,000	22,000
Electric light and power	5	231,000	101,800
Embroidery establishments	3	1,035,000	1,007,000
Engineering construction and repair	3	75,000	20,000
Fertilizer factories	1	100,000	25,000
General Manufacturers	4	610,000	180,600
Hemp stripping	1	40,000	8,000
Oil factories	3	650,000	430,000
Photo studios	1	10,000	2,000
Printing and publishing	6	245,000	123,050
Rice mills	8	335,904	297,314
Saw mills	1	15,000	9,500
Sugar mills and refineries	7	7,351,000	1,916,000
Tobacco factories	1	99,000	25,000
Miscellaneous	77	231,500	95,700
Education (private schools)	30	59,000	14,000
Estate administration (church)	2		
Publicity	1		
Religious and charitable associations	4		
Social and recreation	40	172,500	81,700
Grand Total	272	P.41,726,704	P.13,370,333

Shanghai Tramway Operations

The following are the traffic returns of the Shanghai Tramways for the weeks ended January 7, 14, and 21:—

*The week ended January 7.*  
Gross Receipts \$41,854.76 as compared with \$26,045.45 in 1919.  
Loss by currency depreciation \$10,763.28 as compared with \$8,487.68 in 1919.  
Total Effective Receipts \$31,091.48 as compared with \$27,557.77 in 1919.  
Percentage of loss by currency depreciation \$26.84 as compared with \$24.70 in 1919.  
Car Miles run \$87,999 as compared with \$79,092 in 1919.  
Passengers Carried \$1,866,706 as compared with \$1,637,061 in 1919.

*The week ended January 14:*  
Gross Receipts \$40,830.73 as compared with \$33,158.08 in 1919.  
Loss by currency depreciation \$10,307.88 as compared with \$7,550.05 in 1919.  
Effective Receipts \$30,522.85 as compared with \$25,608.03 in 1919.  
Percentage of loss by currency depreciation \$26.60 as compared with \$24.14 in 1919.  
Car Miles run \$88,913 as compared with \$78,771 in 1919.  
Passengers Carried \$1,832,787 as compared with \$1,503,191 in 1919.

*The week ended January 21:*  
Gross Receipts \$41,076.47 as compared with \$35,033.67 in 1919.  
Loss by currency depreciation \$10,376.02 as compared with \$7,883.55 in 1919.  
Effective Receipts \$30,700.45 as compared with \$27,150.12 in 1919.  
Percentage of loss by currency depreciation \$26.72 as compared with \$23.80 in 1919.  
Car Miles run \$88,595 as compared with \$81,523 in 1919.  
Passengers Carried \$1,843,106 as compared with \$1,594,229 in 1919.

Engineering Expansion at Manila

The Honolulu Iron Works has just acquired by purchase one-half of the controlling interest of the Earnshaw Slipways and Engineering Company, Manila, at P3,500,000, the two entities to be later fused into one single corporation to be capitalized at P10,000,000 to go into marine engineering and into the manufacture of machinery for sugar centrals more extensively than each, as separate companies, has done in the past. This is considered one of the biggest business transactions to be consummated in Manila for many years.

Thomas Earnshaw, who, with his brother Manuel, owns the Earnshaw Company, when interviewed by a representative of the FAR EASTERN REVIEW, declared that it is his intention to increase the plant and to start competing in all the marine engineering fields, such as dry docking, boat constructing and repairing. The Honolulu Iron Works will install a big plant near the Earnshaw Slipway for the manufacture of sugar machinery for sugar centrals.

Manuel Earnshaw and president Davis of the Honolulu Iron Works are now on their way to Manila, and when they arrive the details of the consolidation of the two companies into one single corporation will be fully gone into.

In order to provide for the development of the big corporation, the Earnshaw Slipways and Engineering Company has applied for the lease of a large block of land in the Port District immediately joining the site where the company is now located.

Employees on China's Railways

"For every three and a half officers and clerks employed on the Chinese Government railways there is a servant to wait upon them," is a candid remark in the 1918 report of China's lines.

The total number of employees of the Chinese Government railways in 1918 was 63,795 compared with 60,447 in 1917. This is an increase of 5½ per cent. Over 40,000 of this total are engaged in manual labor, either handling goods, or keeping up the condition of cars, nearly 30,000 are engaged in keeping the machinery and roadways in repair. Clerks outnumber the men handling the trains. More men are employed in policing the line than in running trains over the line. 20,756 men are in the Engineering Department; 14,724 men are in the Locomotive Department; 5,231 men are in the Running Department; 11,750 men are in the Traffic Department; 3,521 men are in the General Administration Department; 537 men are in the Telegraphic Department; 6,878 men are in the Police Department, while other departments employ 398. Compared with railways in many countries, the Chinese lines are heavily manned. This is partly due to the higher labor wage in such countries, which is encouraging the use of labor-saving machinery in offices as well as in the handling of physical things. The higher price of materials in China, due to distance from source, leads to a great deal of repair where in Europe or America purchases of new parts would be made.

It has been decided to open the new Netherland-Indian Annual Industrial Fair at Bandoeng (Island of Java) on May 17, 1920. The object of the Fair is to promote native and foreign manufacturing industries in the Netherland East Indies. It will continue for a fortnight, unless a longer term seems desirable.





Old flood gate, Shantung North River



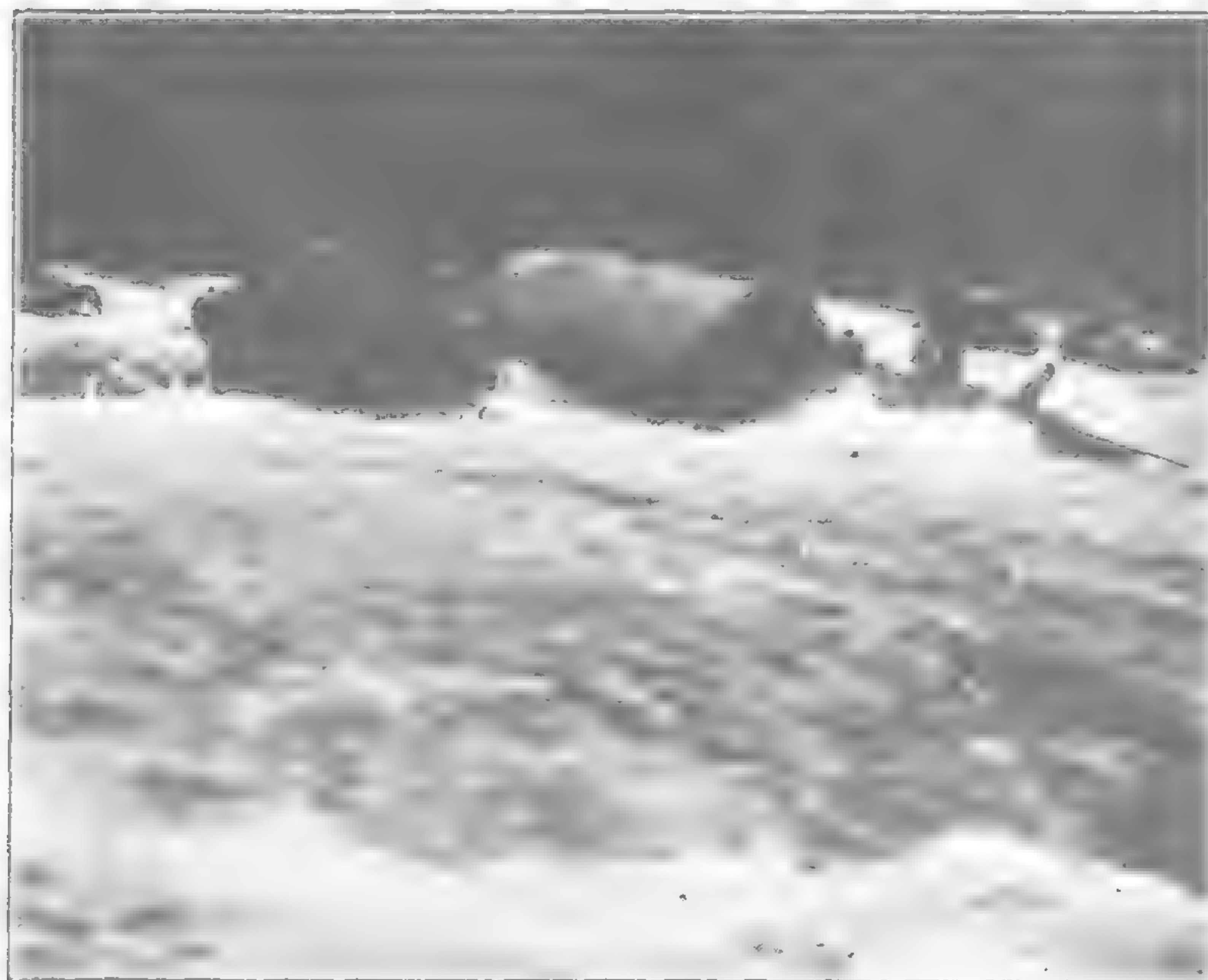
Rapids in the Yung-kiang



Old flood gate, Lower delta



Rapids in the Yung-kiang



An exciting jump! Yung-kiang



The Mongtze Gorge, North River

Scenes on the North River, South China, referred to in the article on "The Flood Problem at Canton" on page 98



# China's Great North-West

## III.—Travel in the Ordos Desert

By Rodney Gilbert

A few hours after sunrise the next morning we came to the last fresh water spring and the last group of trees which we saw in the Ordos and ten *li* further on we wound into a defile in the dunes of black sand and were thereafter sufficiently cheered by the sight of patches of healthy grass or pools of drinkable alkali water. These dunes were nearly one hundred feet high and were built upon a foundation of hard black gravel which showed in spots, where the wind had cleared the sand away, revealing petrified cart ruts which must have been made before there was any sand over this part of the country, because it would be impossible now for a cart to make any progress through these shifting mountains. The secret of travelling with camels through such country seemed to consist in avoiding the hollows and keeping to the ridges. The crescent shaped dunes run into each other and all are linked up in an intricate pattern. We followed their curves and progressed from dune to dune for many hours until even the camels were dripping with sweat and the pedestrians who carried their bedding and provisions on their backs were at the point of exhaustion. The only man who remained cool and tireless was my retainer Ting, who kept up a brisk flat-footed pace along the shifting ridges, choosing a path where there were no landmarks and where the wind obliterated in a few minutes all trace of the passage of men and animals. We descended at last into a little valley where there were grass and firm ground and a very thin trickle of water, turned a rocky corner and saw spread out before us a broad valley dotted with sheep and horses—typical Mongol grazing lands. There were a few low huts in sight, the quarters of Chinese shepherds who were trespassing upon the Mongol preserves, but it was not until evening that we again encountered humans.

### The Burrs of the Ordos

About sunset we came to a village known as Sung Erh Ko Lang, a forlorn group of shepherds' mud huts. A *li* or so on the other side of it on the top of a sand ridge covered with briars and desert shrubbery, we stopped to rest the camels and I dropped off the beast I was riding and announced that I would walk for a time. I had walked a good deal the previous day, and had done twenty *li* on foot that morning in a pair of heavy riding boots. While I was on the camel my feet felt tired and swollen so I removed the boots and wrapped my feet in a sheepskin coat. While the caravan went on, I sat down on a sand bank, smoked a cigarette and then decided to put on my boots and catch up with the camels. It was exasperating to find that my feet were so badly swollen that I could not get into either boot with or without socks. In the Ordos there grows a little plant about a foot high which in the early autumn bears a rich crop of small burrs nearly as large as a peanut and covered with needle-like spines. The sand of the Ordos is, therefore, full of these hidden sorrows, and anyone who attempts to make progress through it without substantial footgear will find his pilgrimage a constant torment. After the first ten steps I sat down and picked a dozen burrs out of the soles of my feet, then I got up, did another ten steps and repeated the performance. By the time I had gone half-a-mile the charm of the desert was entirely lost upon me, and I did not know but what I should have to continue

hopping across the face of the Ordos for the rest of the night. As it was afterwards estimated I actually did about eight *li*, between two and three miles, at the slowest possible pace, before a camel suddenly loomed up before me out of the darkness and a man slid off of it and shouted to me. It was Ting One-eye with my two camels denuded of their packs. The party it seemed, had come to a Mongol well, had built their fires and had then begun to wonder why I did not arrive. Ting made a few scathing comments upon my boots, which he pronounced unfit for wear in such country, and after hoisting me bodily upon the camel he had been leading, he wrapped me up in several big sheepskin coats which he had brought back with him, climbed on the other camel and jogged along towards the camp where we arrived after the others had finished their food and had turned in.

The following morning our start was delayed out of consideration for my condition; and we did not get away until after eight o'clock. We found ourselves in a broad valley in rather sandy country in which a number of small streams running out of sand gulleys into the bigger basin which might once have been a river-bed lost themselves in the dry and porous soil, becoming less instead of greater the further they went. We learned from a horse herd in this valley that the well at which we had stopped the night before was called Paokutou (presumably a Chinese mispronunciation of a Mongol name), that we had tramped ninety *li* the day before and that we were approximately 200 *li* from Paotou. Sixty *li* from our starting point, just as we were emerging from the wide valley into open rolling grass country, we passed a small Mongol temple known as Urustei Miao, according to Ting, where a few aged lamas were in attendance and several hours after dark we came to a well in open country which was known as Taotzekou, where there was a general dispute as to whether we should stop or go on. A biting wind had come up by this time and our pedestrians who were footsore and who were beginning to regret that they had ventured into such desolate country, protested that they had already walked eighty *li* or more and could go no farther. All this while we had been trying to adjust ourselves to a night schedule since camels graze better in the day time. But every night after we had eaten when Ting suggested going on the footsore boatmen who had carried heavy packs on their backs all day, chorussed a vigorous dissent and protested also that we could not leave them when they did not know the road and had been enticed upon this foolhardy journey by promises of consideration. On this night at Taotzekou, Ting therefore announced that he would compromise by sleeping at the well and by getting everybody out in the middle of the night. This he did but the pedestrians were no sooner out of their quilts and sheepskins than they announced their determination in a body to have tea before they started and set about building fires. It was nearly four o'clock before we finally got away and when daylight came we had only covered thirty *li*, most of which I had walked in a pair of bedroom slippers as I still found it impossible to get my boots on. It was decided in general council therefore that there was no use stopping so we went on through monotonous rolling grass land until five o'clock in the afternoon, having stopped for tiffin within sight of the large establishment of the Hanggai Prince, which place is usually marked on maps "Hangking." We had done



seventy *li* that day, the Mongols told us, and a few tent dwellers at the well called Hatatou where we slept, came to our camp and offered to sell us a goat. Our entire party was at once consumed with a ravenous appetite for meat and after an hour's bargaining directed on our part by an old man named Yang, who, at the age of seventy-three, was the briskest walker in our party and the most loquacious entertainer, the goat changed hands for the price of \$2.00, and under the manipulation of twenty-six pairs of willing hands was reduced to edible mutton in less than half-an-hour and the Mongol dogs that sat around in an attentive circle got nothing to munch but such entrails as the Mohammedan will not eat, and the marrowless bones. Ting was much disgusted with the time which these culinary operations consumed, for he felt sure that everyone going to bed late and full of mutton would feel disinclined to get up in the middle of the night according to his neglected schedule. Contrary to his dismal prophecy however, everyone turned out readily when he called us a little before midnight.

The start was made shortly after midnight and just after daylight we arrived at a well known as Ulajirim, according to the Chinese pronunciation of it, where Ting announced that we had travelled sixty *li* during the night. We were now in real Mongol grazing country traversed by countless paths made by the sheep and cattle, and by the cart tracks of Mongol fuel collectors. Ting's sense of direction was therefore put to many severe tests during the darkness of the night, for he had nothing besides this acquired talent and the stars to guide him, and I noticed frequently that we were following no trail at all but were simply advancing in a direct line across open grass country upon which there were no land-marks.

### The Art of Watering Horses

Upon our arrival at the well we found ourselves in a broad tract of particularly rich grazing country, with herds of cattle, horses, and camels dotted over the plain in all directions. Fifty or sixty horses stood drowsily about a watering trough evidently waiting for someone to draw water for them. Half-a-dozen very handsome stallions kept the most desirable positions for themselves by viciously attacking with hoofs and teeth all that approached them, and occasionally they had a skirmish among themselves which usually resulted in a wild stampede of the whole herd. The mares and colts hung on the outskirts varying the monotony by trotting circles about the well and making feints at the much coveted trough. About two hours after daylight a Mongol woman appeared with a watercask and a willow bucket on a long rope. Her coming attracted several hundred more horses and about a hundred cattle and the fight for positions near the well became more strenuous. The animals were disappointed in this instance, however, for after drawing water for us from a well which none of our ropes could fathom, she filled her cask, strapped it on her back, and set out across country. A little later, however, came an old Mongol with two dogs and a boy, and the watering of the herd began. One of the dogs first cut out all the cattle and drove them on to a little mound where he kept them by circling about the mob and by snapping at them until all the horses were watered. The other dog and the boy then rounded up all the colts and mares and they were driven away to another mound where they could come to no harm, and a furious contest ensued. The old Mongol then began drawing water and pouring it into the trough, and kept it up tirelessly for more than an hour. When the fight among the stallions became too serious he would leap among them and lash them with a rope end, upon which the whole herd would stampede, gallop away to a

distance, and stand looking back at him, but as soon as he returned to the well they would wheel about and charge down upon the trough at a mad gallop, fighting and kicking as they came. This was repeated many times until all had had their fill, when the dog that was guarding the mares was called off. With a few short yelps he rounded up the stallions and drove them far out into the grass lands, while the mares and colts timidly approached the drinking place. It now took all the efforts of the small boy and the two dogs to keep the cattle from charging in for they were losing their patience and were snorting and bellowing ominously. When the time came for them to drink, however, they behaved much more decorously than the horses and stood quietly about awaiting their turns.

The members of our party prepared and ate a good meal, and then disposed themselves in the bright sunlight for sleep. A little before noon when everyone was asleep but Ting, who was busy all the while braiding himself a new belt out of eight strands of camel-hair rope, at which camel drivers are all expert, this indefatigable tyrant suddenly rose up with a yawn and announced that we would proceed, kicking the bedclothes off of two or three slumberers to emphasise it. There was a vociferous chorus of dissent, but he prevailed as usual and kept the party going until well after dark that evening when he suddenly sat down beside an alkali pool, pulled off his shoes and announced with a broad grin that he had had enough. Many of the stragglers did not come in until about two hours later, and some of them were really desperately tired and lame. During the day we passed a number of small lakes, and for some time had been trudging through rank grass growing out of soft soil heavily crusted with alkali. At the point where we stopped there were three shallow wells, and the marks of many previous encampments. Plentiful as the water was, it was full of soda and salt, and in the late evening Ting had said that he could see several strings of camels over against the eastern hills, loaded with rock soda. Nobody else saw them, but such was the faith in his superior vision that we took it for granted. About the time that we were ready to sleep, we heard camel bells in the distance, and we debated as to whether there were really camels in the vicinity or whether we were deceived by any other of the weird sounds which one constantly hears in the deserts and grass lands.

### Caravans that Pass in the Night

A few minutes later, however, a grey dog of some size trotted in among us and threw himself down before the fire in the most familiar manner, so we knew that a big string was coming. We did not hear the bells again until the camels were almost upon us, but we were warned of their coming by the abrupt departure of the dog who went out to meet them. The next arrival was a man on horseback who also rode into our midst, turned his horse loose without further ceremony, and took a place at the fire. He was at once recognized by a dozen of our party as a Mohammedan camel owner from Huangchichiao, a farming community in the Ninghsia district, where no camels are reared or graze, but which is peculiarly productive of camel owners and drivers.

The string which followed him had been to Hsinning, and was bringing down the first consignment of the Autumn shipment of wool from the Tibetan border. There were 110 camels, 15 men and a dog. Upon the arrival of the dog, Ting had suggested that we gather more fire-wood, and by the time the caravan arrived we were able to make a hospitable showing, and our five copper boilers were bubbling with a fresh brew of tea. The packs were unloaded all about us,



and the dog that had made himself so much at home with us upon his arrival no sooner had property to guard than he became a nuisance, snapping at everyone who ventured away from the fire.

This was the first fully equipped camel train that we had encountered in the desert, and I was interested in seeing them make camp, which they did with perfect system and expedition. Very many had a hand in it and yet there was no confusion. A site was selected, cleared of brush, and swept, a tent went up as if by magic, fuel and water were brought, skins and rugs were strewn about inside the tent, and in a very few minutes 15 men were sitting in a compact circle about a steaming pot inside the tent while the dog lay curled into a muff at the entrance.

After all the others were wrapped up in their bedding and Ting was perfunctorily washing the pots and pans, he announced that we had travelled 110 *li* that day—the route having been over soil that provided very bad walking—that the place of our repose was known as Chaosu, and that he was inclined to let the party sleep a little later than usual unless he waked during the night. I had become so accustomed to being roused unceremoniously at unholy hours that I awoke three or four times during the night with a start expecting to hear the bustle of departure. Each time I got up on my elbow and looked at the pile of quilts and skins which concealed the indomitable Ting, and sank back with a sigh of relief. When I did finally awake it was daylight; the tent with its 15 occupants, the dog and wool bearing camels had all vanished, and the disgruntled pedestrians of our party were sitting up in their quilts yawning with satisfaction after a real sleep.

From this time forward we began to feel that we were nearing our destination. Our course changed somewhat, being now a little west of southwest. We saw many ranges of low hills which are visible from the Yellow River about Shihtsuitze, and our course was crossed by numerous paths and cart tracks made by Mongol travellers and Chinese traders who come back and forth from Shihtsuitze to the camp to Oto Wang which is known as Tungwangyehfu, in contrast with Hsiwangyehfu, the home of the Prince of the Alashan.

### The Deep Wells of the Ordos

Thirty *li* from Chaosu we came into a deep hollow filled with wind-cut stones and overlooked by a small monastery. The members of our party amused themselves by dropping pebbles into the two wells that had been dug in the centre of the hollow. Each one had a different system for working out the depth of the well by the time that it took a pebble to reach the water, but a lama settled the dispute by telling us that one was 130 and the other 170 Chinese feet in depth, and that the digging of them had cost nearly 400 taels. I had been on the lookout for these very deep wells in the Ordos, for I had heard many accounts of them, but these were the first which we had seen. Over a great part of the Ordos there are no streams and no large bodies of fresh water, so that while the soil is good and grass grows abundantly, there is no possibility of irrigation and the Mongols are forced to dig deeply to get enough water for their herds.

The country from this point onward afforded more variety of scenery. There were rolling hills with low ranges of mountains in the distance, intersected by sandy stretches and stony hollows, and nearly all of our travellers were able to pick up land marks which they recognized from their experience as boatmen on the Yellow River.

To the west, perhaps 20 or 30 *li* away, there were several round sugar-loaf hills, among which Ting informed me was Hsinchao, a large monastery and settlement, which

is one of the few places marked on maps of the Ordos. We had a long rest by the deep wells, and then set out again about noon and travelled in a direct line toward the western end of a range of hills known as Hungshan. An hour after dark it was decided that we could not reach the well which Ting had selected as a stopping place so we determined to turn out of our course and find one of the camping places used by travellers from Shihtsuitze. We travelled three *li* due west along a cart track and quite unexpectedly stumbled upon a well at a place called Nayunggol, which was recognized by a number of our party who had made short expeditions into the Ordos.

From this time forward Ting was no longer sole oracle among us, for many of the boatmen who had made short trips into the grasslands began to orient themselves, and each displayed his limited knowledge of the country by attempting to guide the others to the particular wells or small monasteries which he had at some time visited. Dissension at once arose among us, but Ting contrived, partly by diplomacy and partly by bullying, to keep his little army together for several days more until we came almost in sight of the Yellow River when numbers were no longer of any particular advantage. The weather also turned against us, a high wind came up, and it became bitterly cold, while the sky was overcast and threatening. At Nayunggol the wind scattered our fires so often that we did not succeed in cooking a meal until nearly midnight, and then Ting, who said the weather looked so ominous that we who had no tents could not afford to linger by the wayside, got us up after two hours' sleep and set out again in the face of a driving wind and under heavy clouds. In the morning we came to a sandstone hollow with a well in its centre and with a few shepherds' huts on grass grown hummocks in the neighborhood. The horse-herds of Prince Oto had also cut a number of caves in the sandstone near the well which afforded them shelter in bad weather. This place had once been an important cattle trading centre, frequented by both Mongols and Chinese, and had the Chinese name of Changsanniu-ch'ang, the corral of Chang the 3rd, the latter being a resident of Shihtsuitze.

### A Night in the Rain

We had barely finished breakfast here when the wind dropped, and a light flurry of snow settled upon us. This changed almost immediately to a misty rain and after some minutes of indecision, we gathered up our effects and sought refuge in one of the sandstone caves hollowed out by the horse herds. It would have been a very comfortable shelter for a small party, but for 27 of us packed in bag and baggage it was decidedly inconvenient. The atmosphere outside was raw and cold, and by the time we had settled ourselves and had exhausted the resources of the Ninghsia dialect in comments upon the weather, it was so warm and close that drowsiness overcame us and we dropped off to sleep as a unit, and slept soundly for perhaps an hour. Someone near the entrance then crawled out and came back to announce that it was raining hard. The prospects for the night were not cheerful. The cave in which we had found shelter would not have provided comfortable sleeping quarters for half-a-dozen of us, while three or four of us at most might have found accommodation in some neighboring shepherds' huts.

Ting, with his usual enterprise, suggested at once that we start out in the rain for a Monastery 30 *li* away at Doloa-guei. The only dissenters were the owners of the ponies and donkeys, who elected to remain behind and find shelter in the caves or huts. The rest of us set out in the cold drenching rain, which became heavier towards evening, and tramped on 30 *li* through the long wet grass and slippery alkali flats to a little cluster of one-story houses occupied by a single lama,



a few *li* from the monastery of Doloaguei. Ting and I arrived first with our camels, and the old man who had only a single habitable room agreed cheerfully to accommodate three or four of us on his *k'ang*, and set about building a brushwood fire in a brazier. Two or three others arrived a few minutes later and were also welcomed, and the old lama was just making us comfortable and helping us hang our water-soaked clothing about the room when the whole water-logged army trudged in, numb with cold, and, despite the lama's protests, insisted upon crowding about the fire. It was physically impossible to turn them out, so another unfurnished room was opened up, and all but a few of us were invited to camp on the floor. Five of us slept on the lama's *k'ang* that night, which had been designed for his sole accommodation, while five others found accommodation on the floor of his little room. Eleven others occupied the floor of the other room. All slept in wet bedding, and as there was not sufficient fire in either room to dry the clothing, no change of garments was possible. Those of us who reposed on the hot *k'ang* were able to keep warm, but all the others got so cold shortly after midnight that by mutual agreement they dressed, repacked their effects, and trudged on through the night rain to a larger and more commodious monastery.

After daylight Ting and I and a camel driver named Ka-tze, who was always with us, were able to dry our clothes and to make a little tea, after which we set out through a thick fog and travelled 25 *li* to a well called Tsabawo, where the other travellers had stopped and were drying all of their belongings on ropes and poles. That night just after dark, we crossed a stream of water and came to a shepherds' village, half Chinese and half Mongol, known as Gumburdo. We passed through the village and camped about the well, that is three of us did, for nearly all the others were now in country familiar to them and went on to whatever stopping place appealed to their particular whims or fancies. I went to bed that night with a cold and a fever as the result of drenching and exposure but got awake in the morning feeling thoroughly recovered, to find two inches of snow on top of me. A circle of Mongol dogs squatted on their haunches about the camp, made friendly overtures while we were preparing breakfast, but became very hostile when we tried to approach the village for water. The camels had found little grass in the neighborhood, and had strayed a long way off so that by the time they were recovered, and breakfast had been disposed of, it was late in the morning.

### Fertile Country Once Again

After we had gone a few *li* we crossed an eminence upon which stood a mud watch-tower, and had a glimpse of the Yellow River, of the agricultural country on its west bank, and of the Alashan mountains behind it. Following the path which descended towards the river through an intricate network of gulleys, we came out into flat meadow land, over all of which the grass grew nearly as high as a camel, and forced our way through to the bank of the river.

We were here about 80 *li* south of Shihtsuitze, and about 120 *li* north of Ninghsia. A number of ferry boats usually crossed and recrossed at this point, which is known as Hungpatze (the red cliffs), but we had to travel fully ten *li* along the river bank before we came to one which was already heavily loaded with soda. After much persuasion we were allowed to put the camels on board, and in a very few minutes had gained the opposite shore and were making our way through cultivated fields and over irrigation ditches.

The river here is the only barrier between the desert and the very fertile agricultural country on the Ninghsia side. The high plateau country on the east of the river is extremely desolate, more barren than much of the Ordos

proper, too high for irrigation, and too poor in grass to afford much grazing. But on the west side of the river in the belt of flat land which extends westward to the Alashan mountains, the country has been irrigated by an elaborate system of ditches for a thousand years or more and is highly cultivated and fertile. At Shihtsuitze, 80 *li* north of the point at which we crossed, a spur of the Alashan runs down to the river bank and with the desolate bluffs opposite forms a gorge which marks the northern limit of all agricultural effort, but not of all agricultural possibilities, for at many places along the course of the river between Shihtsuitze and Paotu there are hundreds of square miles of flat country well grown in grass which could be readily irrigated and planted.

The three of us, Ting, Ka-tze and I, were the only ones of our party who contrived to cross that day, for as we learned later the others had gone to a ferry further down stream which was not then operating and did not manage to make a crossing until the following morning. A few *li* from the bank we passed through Ka-tze's village, where he left us, and went on another five or six *li* to a farmhouse in the community of Lingshuipi, which Ting entered with an air of familiarity, and, after unloading the camels, described as his home. From the camel driver he was at once converted into the host, and having rounded up his father and mother, his brother's wife and child, and having introduced them all, the whole household set to work to make the "distinguished visitor" as comfortable as their very cramped and limited quarters and their still more limited means permitted.

The Ting family was very poor but I was received with the dignity and grace which characterizes honest agricultural folk the world over, and no apology was made for poor quarters or coarse food. The homestead was a mud hovel of four small rooms without windows and with rickety doors made up largely of cracks and patches. There was also a little detached shed on which a donkey and an ox were housed. The four dingy rooms sheltered the elder Tings, man and wife, my servant, the one-eyed Ting and his brother and five children. Two dogs and a cat were the dependents. Old mother Ting was very much a tattered wreck and was kept out of sight, while Ting senior, who had been a big man like his son, but who in his 72nd year was broken down by rheumatism and insomnia, told me that life was a burden and that he longed for release from it. I was assigned a place on the old man's *k'ang* and had heard the whole story of his ailments and troubles within ten minutes of my arrival. By some fortunate turn of the conversation, it came out after a time that he had been a muleteer with the conquering army of Tso Tsung-tang and had followed the victorious Hunanese as far as Hami in the conquest of Turkestan. Having learned this much, I enticed the old man to tell stories. As he warmed to his subject, his querulous tone disappeared and for the rest of the evening he proved himself a first rate raconteur. I spent the next day with the Ting family and contrived to learn a great deal about their mode of life and their devices for making ends meet. It occurred to me then that though I had travelled many thousand miles in China, I had never before been the guest in a plebeian Chinese household and had had no opportunity of becoming familiar with the life of a people who make up the vast majority of China's population. I think too that this is true of most foreigners and if my life among the Tings is any criterion, I believe that a more intimate knowledge of people of their class would give us a more sympathetic understanding of the Chinese and a fuller appreciation of their inherent good qualities which are so often held in abeyance by the hard economic conditions under which they live. The Ting brothers cultivated a little over eight acres of land. Part of the produce from this was set apart for the old people and in the balance the brothers shared equally. Enough grain was set aside in big earthenware



gars for winter provision and the trifling balance was sold to buy clothes. Both brothers were camel drivers in the winter and it was by virtue of their earnings abroad that the family subsisted, rather than upon the meagre produce of their land which was poorly irrigated and was everywhere white with soda.

Ninghsia is in the centre of a strip of irrigated land lying between the Yellow River and the Alashan mountains, which is nowhere more than twenty miles wide, and which is possibly 170 miles from north to south. The mountain range, while it is rugged and magnificent and provides a splendid contrast with the green lowlands along the river's bank, supplies little or no water to the farmers and as the rainfall is insufficient, the crops are dependent upon the irrigation ditches which bring water from the Yellow River into the farming country and carry it back into the river again. There is one long canal which runs past Ninghsia and which parallels the river throughout almost the whole length of the agricultural country. These irrigation canals are certainly very ancient and their maintenance is a heavy expense to the country for the silt from the Yellow River fills them up rapidly and every farmer is required to work so many days a year for each thirty *mow* of land that he cultivates, at excavating in the canals, or to pay subsidies at the rate of forty coppers a day for it. Thanks to the water supply thus provided, the Ninghsia district produces rice which is grown in very few places in the northwest of China, and also great quantities of hemp shipped for the most part to Paotou and thence to the coast. The large production of wool in the hills on both sides of the Yellow River affords work for many camels and in some of the Mohammedan communities, notably in Huang-chichiao, nearly every farmer is a camel driver in winter and all those who prosper invest their surplus profits in camels.

Ninghsia is famous in China for the carpets produced there but while small carpets of a very fine texture are manufactured, the larger rugs are usually of no better quality than those manufactured at the coast and do not seem to be much cheaper. Marco Polo in his account of Ninghsia, says that the place was famous for a fabric manufactured from camel's hair, in which the wool of white camels was much used. On my several visits to Ninghsia I made inquiries about this material but have not been able to learn that it is still manufactured. The white camels do, however, exist. There are probably some white camels in every camel breeding community in Tartary, but the percentage of white camels in the Alashan district is certainly higher than in any other which I have visited, and as they are usually very tall and powerful, one is led to believe that originally they were probably a separate breed which the natives have not taken the trouble to keep distinct. Ninghsia is better known to Chinese at the coast for a kind of sheepskin used in lining the clothes of the wealthy and ultra-fashionable, known as *tan p'i*. The wool on this skin is in long, silky spirals, peculiarly fine and soft and the skin itself is remarkably thin and light. It is now very rare, even in Ninghsia, and commands very high prices.

The Ting farm was about seven *li* from the main road between Shihtsuitze and Ninghsia. It would have been out of our way to have travelled by it so we took the river road which runs all the way through Mohammedan villages a few *li* from the riverbank, in which boat building seems to be the sole industry. We set out on the morning of October 31, and after struggling through a maze of irrigation ditches both great and small for seventy painfully long *li*, we arrived after dark at the Mohammedan community of Chingshui-pu. We took it for granted that there would be some accommodation for travellers there but found that there was no

inn and as it was already dark, we were just beginning to worry when Ting remembered that one of our fellow travellers across the Ordos, an old man named Yang, owner of the two donkeys in our caravan, lived in Chingshuipo so we made diligent search for his house and finally found it about a quarter of a mile from the walled village. We were received by the entire family, and it was a very large one, with a noisy welcome and were ushered into a big living room well heated with a brass brazier and provided with a huge *k'ang* upon which 11 of us slept that night very comfortably. The Yangs, like the Tings, were farmers but they were farmers on a very different scale. We had no sooner made ourselves comfortable on the *k'ang* than food began to appear in great abundance and great variety and it kept on coming as long as anyone was awake to eat it. A horde of grandchildren, clean, good-looking and rather well dressed, lined up along the *k'ang* and stared at the visitor for several hours, while old grandfather Yang, who was very garrulous and quite a wit in his way, poured tea for me and lectured his progeny for several hours upon the habits, mannerisms and peculiar virtues of the stranger within their gates. He had business in Ninghsia, so the following morning he set out with us mounted on his donkey, and travelled with us the remaining fifty *li* to the city.

## Rolling Stock on China's Railways

On the fourteen railways owned and operated by the Chinese Government there were in 1918 a total of 653 locomotives (including 22 composite locos.), as compared with 648 in 1917, 638 in 1916, and 629 in 1915. Of these 204 were passenger locos.; 320 goods locos.; and 129 shunting locos. There were 3.7 passenger locos per kilometre of line; 5.8 goods locos, and 2.3 shunting locos. The total tractive capacity of the passenger locomotives was 1,954,444 metric tons, while that of the goods locomotives was 3,239,984 metric tons, and the shunting locos 835,519 metric tons.

The number of goods wagons on the Chinese Government railways at the end of December, 1913, totalled 10,748, being an increase of 89 over the number reported for the same date in 1917. The Tientsin-Pukow railway acquired practically permanent use of 50 open and 150 covered wagons with the capacity of 30 tons each, but omitting this 6,000 tons and all other leased equipment, the capacity owned at the end of 1918 was 243,065 tons. Covered wagons have an average capacity of 23.8 tons, and open wagons 22.5 tons. Carriages totalled 1,231 with a carrying capacity of 61,794 passengers. This number of cars includes 12 dining cars, and 26 postal vans. The seating capacity of carriages is greater as the class is lower. The 1st class average about 32, the 2nd class 54, and the 3rd class 75 passengers. The value of the higher class carriages is greater and the weight fully as much as the lower class. The best performance per seat is 133 kilometres per day. The average performance is 103 kilometres per day.

Reports from America state that Japan has agreed to withdraw the demand made that Mongolia and Manchuria should be excluded from the operations of the new Consortium. Provided that the Powers will respect all Japanese financial, economical and political privileges and rights in Manchuria which have been obtained from the Chinese Government previous to the organization of the new Consortium. Reports from Harbin also state that the provincial assemblies and Chambers of Commerce of the Three Eastern provinces also desire that the demand of Japan for exclusion should not be complied with. They propose to hold a conference at Changchun "to oppose the Japanese demand by every means at their disposal." If it is true that Japan has herself cancelled the demand, then everybody should be happy.



# Engineering, Financial, Industrial and Commercial News

## RAILWAYS

**Railway Improvements in Japan.**—The Japanese Railway Board intends to lay six tracks between Tokyo and Yokohama and between Osaka and Kobe, adding a double-track to the quadruple line previously decided on. The Board's purposes for this scheme are, (1) the sole use of the inside double track for the express train service; (2) the use of the second line for passenger trains of the slow or local services; and (3) the third double track will be for goods trains. The lines themselves are the smallest part of the undertaking involved, and if an eventual sixfold track is decided upon it is to be presumed that the viaduct will be constructed of that width from the beginning.

The section of the newly built railway between Fengcheng and Pingtichien on the Peking-Suiyuan line has been opened for traffic. This extension was dealt with in the FAR EASTERN REVIEW of November 1919.

**Japan's Railway Estimates.**—The estimates for the Japanese Government Railways for the coming year show an increase of some ¥45,000,000 in wages and ¥25,000,000 in the cost of materials, especially coal. These circumstances have forced the Government Railways to introduce a change in the rates for passenger service on all rail lines and freight charges on some steamship lines, the new rates to be effective on and after February 1st, 1920.

**Extensions in Philippines.**—The Manila Railroad Company is planning an extension of the northern line of the road as far as Aparri, Cagayan, which is the northernmost province of the Island of Luzon. The extension will begin at Cabanatuan, Nueva Ecija, passing through the northern provinces on nearly a straight line and ending at Aparri, which is the largest seaport in the Province of Cagayan. At present the Cagayan Valley, the greatest tobacco producing region in the Philippines, is without direct communication by land with the rest of Luzon. When the proposed extension of the railroad becomes a reality, however, the Cagayan valley will be brought into direct daily contact with Manila and the other cities and Provinces on the Island of Luzon.

## TRAMWAYS

**Canton Tramway.**—According to the "Canton Times" the Canton Municipality has addressed a letter to the Kwangtung Tramway Company, requesting that the balance of the first instalment of \$200,000 which has been overdue be paid up to the Municipality at once. It is learned that up-to-date only \$140,000 have been paid by the Tramway Company, leaving an overdue balance of \$60,000. The second instalment of \$200,000 is also due. For the concession the Tramway Company will have to pay \$1,000,000 in five separate instalments. The money received by the Municipality from this source is devoted to the construction of new streets which are being rapidly completed.

In response to a petition from certain Canton gentry the Prime Minister at Peking has telegraphed to the directors of the Canton military government demanding the cancellation of the concession granted by the Canton Municipal Council to certain British merchants for the construction of a tramway in Canton City. The petitioners make the allegation that for the payment of a sum of \$1,000,000 by instalment, that is, \$50,000 each year, they have been granted the tramway monopoly for twenty years. They also state that of the merchants to whom the contract has been granted two are British subjects and one is a Chinese naturalized as a British subject. This means, according to the petitioners, that should any trouble arise in connection with the concession the Government would have to submit to the decision of the British court of Hongkong. They also declare that whenever there is trouble the British will certainly land troops to protect the tramway. On account of these allegations the Premier has demanded that the Canton Government cancel the contract.

**The Nagasaki Tramways.**—The Nagasaki Electric Tramway Company's new line from Sakuramachi to Furumachi will be opened during February when it is proposed that the fares on the entire system be doubled.

## MOTORS

**A New Motor Boat Co. in Canton.**—Generals Li Fook-lum and Ngai Bong-ping, Mr. Chan Lim-pak and others have raised \$100,000 for the organization of the Chu Kiang Motor Boat Company in Honam, Canton. Several motor boats have been built. It is said that General Ngai Bong-ping has ordered a motor boat to run more than thirty miles an hour.

**Canton has Ten Automobiles.**—According to the count taken by the police department regarding the number of motor cars and motor cycles now in use in Canton, there are at present ten motor cars of various make, one small toy motor car, and fourteen motor cycles. Of the ten automobiles, the Military Government owns three, General Li Lieh-chun three, Tuchun Mr. Ying-hsin two, General Ma Chi and Commissioner of Finance Yang Wing-tai one each.

**Motor Buses at Hongkong.**—Hongkong has now a service of motorbuses which run from Victoria City along the new road to the rear of the Island. There are five buses, three of which are designed for fifteen passengers and two for twenty-one. They are built on 32 h.p. Overland motors, fitted with Torbinson final drive. They are arranged on the charabanc style and ample protection against weather is provided.

**Motor Boats Coming Into Favor.**—Generals Li Fook-lum, Ngai Bong-ping, Mr. Chan Lim-pak and some others have raised a capital of \$100,000 for the organization of the Chu Kiang Motor Boats Company in Honam, Canton. Several motor boats have been built. It is said that General Ngai Bong-ping has ordered a motor boat which may run more than thirty miles an hour. It will be launched very soon.

## ROADS

**From Canton to Whampoa.**—It is reported that Mr. Tsen Chunhsuan has given instructions to have plans drawn up for the construction of a highway from Canton to Whampoa, the road to be two hundred feet wide. In connection with the building of this road there is again much talk of developing Whampoa into a seaport capable of accommodating ocean-going steamers.

The construction work of the first and second sections of the automobile road from Sunwei to Hokshan in Kwangtung Province has been completely finished and the third, fourth and fifth sections are now being built. It is expected that the whole road will be finished by March.

**New Road in South China.**—The construction work of the proposed automobile road between Fatshan and Chenchuen, Kwangtung Province, China, will be commenced within the next two months and the expenses will be wholly defrayed by the Canton-Hankow Railroad Company. It is alleged that a railroad will also probably be built, if the communications between the two points demand it. The export and import trade as well as the money transactions between these two places are now under investigation.

## SHIPPING

**New Pacific Project.**—It is reported that a new shipping line is being promoted to operate steamers between Japan and Chile. The capital to be two or three million yen.

**A New River Company.**—It is reported that an American river company is being formed for the purpose of operating a line of vessels on the Yangtze between Shanghai, Hankow and Chungking. The vessels operated by this company will fly the American flag, and it is expected that the first vessel will be placed on the river trade at the end of February.

## INDUSTRIAL

**Hing Wah Paste Co. Expanding.**—The Hing Wah Paste Manufacturing Co., Ltd., proposes to extend its business in North China. Plans are in hand for the erection of a new flour factory in Shanghai, says the Hongkong "Daily Press." Mr. Sin Nai-lun, the chief manager and director of the company, has recently returned from a visit to Shanghai after arranging for the opening of three branches, (1) in Shanghai for handling business in the provinces along the lower stream of the Yangtze, (2) in Hankow for operations in the provinces along the upper stream of the Yangtze, and (3) in Tientsin for tapping the provinces in the North, the Three Eastern Provinces, Manchuria and Mongolia.

**Cotton Mill Project.**—A big cotton mill owner, Mr. Cheng Fook-tung, of Haiphong, is planning to visit Canton and start a cotton mill there. Mr. Cheng at present operates three cotton mills in French Indo-China.



**Match Factory for Kwangtung.**—A proposition is afoot to establish a match factory at Chao-chow, in Kwangtung province, with a view to encouraging native products. The capital is to be \$100,000.

**Arsenal at Antung.**—The Japanese are reported to have established an arsenal at Antung.

**Converting Ramie into China Grass.**—A new machine, of novel construction, says the "Indian and Eastern Engineer," has just been invented in England for producing economically, and in large quantity daily, from ramie, an uninjured fibre, like the hand-cleaned China grass produced in China. It will be easy to operate, no skilled labor being necessary, cheap for the planter to purchase, and is especially made to stand prolonged work in plantations without getting out of working order or its parts breaking.

**Shanghai Dock and Engineering Co.**—The Directors of the Shanghai Dock & Engineering Co., Ltd. have decided to pay an interim dividend of Tls. 5 per share on February 4.

**Industrial Development in South China.**—The acting Civil Governor of Kwangtung Province is anxious to see local industries promoted in the different districts of this Province. He has authorized all the district Magistrates to organize within three months a bureau for the promotion of local industries in their districts. In districts where no funds are available for the work the Canton Government will subsidize the maintenance of the district bureau.

**Factory Congestion in Bombay.**—Overcrowding in Bombay to-day is much as it was in Manchester fifty years ago. The city, itself on an island of only 22.35 square miles in area, says a writer in "Capital," Calcutta, has 83 cotton mills not to speak of the many saw mills, dock-yards, engineering plants and other factories. The industrial population has grown out of all proportion to the housing possibilities, resulting, as in any large city, in land speculation on the one hand and demoralization of the workers on the other. As the great latent power of the western ghats for producing electricity is developed it is evident that new mills will gradually spring up on the mainland where space is not limited and transportation problems are rendered easy by railway or motor lorry. If adequate plans are laid now for such an industrial development we may confidently look forward to a new Bombay entirely free from cotton mills. Abundant examples of such development are to be found in the past two decades in many English cities. It is to be hoped that the municipality will accompany their industrial changes with adequate modern housing provisions, which will obviate a repetition of Bombay's slums.

**Projected Distillery.**—Machinery for a new distillery plant on its way to Shanghai was intercepted in its mission by the grounding of the s.s. *China* at Nagasaki in January. The machinery was the property of Mr. Wallace Rosenblat, one of the famous "seven brothers."

**A New Japanese Company.**—A concern called the Shantung Industrial Company is to be established with a capital of Yen 10,000,000 to operate in Shantung. A large tract of land in Tsingtau has already been purchased by the company.

**New Sugar Central.**—A big sugar central is to be built on the extensive sugar estates of the Yulo brothers, at Binalbagan, Occidental Negros, Philippine Islands, sometime this year.

**Industrial Development of Kwangtung.**—The acting civil governor of Canton at a New Year reception inaugurated a discussion of the ways and means for the promotion and development of native industries in Kwangtung. He said the time had arrived to stimulate industrial development and it was his desire to bring about more co-operation between capitalists, business men, and modern educated technical experts in the starting of new native industries and the carrying on of private enterprise. It was announced by the head of the Industrial Promotion Bureau that an Advisory Board composed of returned students and others who are experts in different lines of industrial activity will shortly be formed for consultation and investigation.

Reports from Canton state that the Star Leather Company, which was organized in the summer of 1918, with a capital \$100,000 by some graduates of American Universities is continuing in full operation the factory being near one of the tributaries of the Pearl River in Pak-Hoh-Choh, Honam, Canton. The factory is equipped with up-to-date American machinery and is being managed on modern lines. The factory produces about five hundred sq. ft. of upper leather per day, the best grade of which is sold at Canton for 64 cents a foot and the poorest at 42 cents. The leather is said to be cheaper than the foreign by 50 cents a sq. ft. The product is somewhat coarser than imported leather owing to the poorer quality of local hides.

**Projected Camphor Industry for Philippines.**—A new industry, the growing and manufacture of camphor, may soon be established in the Philippines if negotiations now pending toward this end succeed, says the "Philippine Free Press." The local representative of the E. I. du Pont de Nemours and company, of Wilmington, New York, wholesale consumers of camphor in the manufacture of pyralin and celluloid, has written a letter to the secretary of agriculture and natural resources, through the director of forestry, asking for information as to the possibility of obtaining from 5,000 to 10,000 acres of land suitable for the growing of camphor. Director Fischer, in his letter transmitting the company's query to the secretary of agriculture and natural resources, strongly recommends that the government either sell or lease to the company some 20,000 acres of land in the Mountain province where, Director Fisher says, camphor trees grow very well indeed, according to experiments already conducted by the bureau of forestry.

## AVIATION

**Private Plane for Shanghai.**—Shanghai's first privately owned aeroplane, ordered in England by Major William R. McBain, is due to arrive in Shanghai shortly. Major McBain has not only bought the machine, a large two-seater of the Armstrong-Whitworth make, but has laid out his own private landing field at Hungjao and erected a hanger suitable for housing it when it arrives.

**Protest against Aeroplane Loan.**—The French Minister has lodged a protest with the Chinese Ministry of Foreign Affairs against the Vickers' Aeroplane Loan on the ground that in the 3rd year of the Republic an understanding was reached between China and France that if China should buy or repair flying machines France had the preferential right to undertake such supply and repair for ten years, and that if China should make any loan in which flying machines were involved France should first be consulted.

**Aero-Club of Shanghai.**—A new Aero-Club called the Aero-Club of Shanghai has been formed in this city. The purpose of the Club is to advance aviation in all its lines. Shanghai is said to be on the main line on both ways of the "Round the World Trip."

**Commercial Aviation in the P. I.**—The first delivery of commercial goods by seaplane in the Philippines was made by W. N. Bartholomew of Erlanger and Galinger, who carried over a Victor victrola to Captain A. Hill at Cavite on a Curtiss seaplane early in January.

## ELECTRICAL ENTERPRISES

**China's Wireless Telephones.**—Remarkable results were obtained at the official tests of the Marconi wireless telephones which are guaranteed to operate for 40 miles. The trials were carried out between Peking and Langfang. Reuter's Peking Correspondent reports that a more powerful current interfered with the experiments and the operators, concluding that the Japanese were interfering, sent a message to the Japanese wireless station explaining the circumstances and asking them to hold off. No reply was received but the current which was cutting in grew stronger. The trials were then delayed. Subsequently the best results were obtained proving the power and efficiency of the machines in the most remarkable manner. A ship at sea, recognizing the wireless telephones, though it was the first time that they had been used in the Far East, asked who was using wireless telephones. The operators explained, satisfying the seamer's curiosity. These instruments were illustrated and described in the FAR EASTERN REVIEW of December, 1919.

**Project for Shatau.**—A capital of \$20,000 has been raised to organize the Lee On Company in Shatau, Namhoi district, Kwangtung Province, by Ho Yim-tong and other merchants there for the purpose of starting an electric light plant in that town. Applications have been despatched to the Canton Administration for consideration.

Some of the wealthy Chinese in Suchian, Kiang-su, are endeavoring to arrange to install an electric light equipment. They also have plans to buy motor trucks to convey goods to Hsuehowfu, which is connected with the Tientsin-Pukow and Lung-hai railways.

**Plant Closed at Ichang.**—A correspondent writing from Ichang, Hupeh province, calls attention to the inadequacy of the Chinese with regard to the management of the Ichang Electric Light Company. He says the Company seems to have fallen upon evil days as it has not supplied light for about two weeks, with little prospect of operations being resumed in the near future.

**Inadequate Telephone System in Canton.**—The inefficiency of service and inadequacy of equipment which have long been felt in connection with the Canton telephone system are the points of attack in plans for improvement now in progress. Heretofore there have been four distinct public telephone stations—Main, West, East and South, handling 700, 800, 400, and 300 telephones respectively—and three private stations—the Military Governor's with 100 telephones, the Civil Governor's with 50, and the Police Commissioner's with 100. Antiquated equipment, poor construction, and untrained operators have added to the doubtlessly justifiable dissatisfaction. Concentration into one central exchange with new equipment, which is now planned will give much needed relief.



**Electrical Developments in India.**—Two officials of the Government have been appointed to make a survey of available waterpower in India, and are making progress in their report, which, when ready, should lead to a tremendous growth of electrical industries in India. Although long a predominantly agricultural country, India has vast industrial possibilities, and capital will not be lacking to develop them when the problem of power is solved. From a report of Mr. Meares we read that "the actual capital represented by the Electric Supply and Traction Federation of India is stated to be about 14 crores (about G.\$47,000,000).

**Suan Mine Power Plant.**—The continually growing demand for an increased supply of power makes it necessary for the Seoul Mining Company, Korea, to again look into the hydro-electric possibilities in the neighborhood, or to consider an increase in the capacity of their power plant. The whole of the power used on the Suan Concession is supplied from the Company's power plant situated on the main river and close to the railway station at Pyeng Yang, some 55 miles from the mines. During the year the supply of electricity was well maintained and the plant was in full operation for 98.57 per cent. of the total time as compared with 98.3 per cent. in the previous year. The usual annual Government examination of the plant resulted in a most favorable report being made. Owing to the price of coal having been raised from \$3.52 per ton to \$7.82 per ton in June, 1918, the power cost shows a heavy increase, being \$0.0174 per KWH for the year as compared with \$0.01175 per KWH for 1917.

## MINING

**Kailan Dividend.**—The Chinese Engineering and Mining Company, Limited, made a profit of £793,846 during the year ended June 30, 1919. A dividend of 20 per cent. was paid. About £300,000 was required to pay excess profits duty. The balance carried forward was put down at £293,846.

**Philippine Dredges.**—This company was formed in Melbourne in 1912 to acquire alluvial gold ground on the Paracale river, Luzon, Philippine Islands. The company also owns a majority of the shares of the Paracale Bucket Dredging Co., operating ground adjoining. John McWhee is chairman, and William Telford is manager. The report for the year ended October 31, 1918, shows that the two dredges of the Philippine Dredges Co. treated 527,606 yards and 490,376 yards, winning 4,894 oz. and 2,112 oz. respectively. The two dredges of the Paracale Co. treated 259,373 yards and 555,287 yards, winning 1,401 oz. and 3,861 oz. respectively. The profits from the company's dredges were £7,705 and the dividends received from the Paracale Co. were £2,853. After the payment of administration and other expenses, the divisible profit was £4,183. Dividends absorbed £8,730, or 5 per cent., being partly paid out of the profits brought forward from the previous year. Operations were greatly impeded by inability to effect repairs, and since the close of the year under review one of the Philippine Co.'s dredges and one of the Paracale Co.'s dredges have suspended operations until necessary repairs are made.

**Yunnan Mining Development.**—General Tang Chi-yao, Military Governor of Yunnan, has sent two of his staff, Yeh Shau-yu and Tseng I-nan, to proceed to the South Seas, in order to urge the wealthy Oversea Chinese merchants there to return and operate the mines.

**The Chaitang Mines.**—Lu Tia-yuan, Provincial Chief of Anhwei province, has been appointed Director-General of the Chai-tang Coal Mining Industry.

**Huan Mining Agreement.**—It is reported that General Chang Chin-yao, Military Governor of Hunan province, has, under much pressure, cancelled the mining agreement which he made for the development of mines in Hunan, and which was published in the FAR EASTERN REVIEW of December.

**Shansi Mining Development.**—A report that the Peking Government has granted extensive mining rights in Shansi province to foreigners caused strong opposition to be voiced by certain natives of the province. Their activities caused the Peking Government to issue a denial. The protests have nothing to do with the arrangement recently made by the Governor of Shansi province with the Kailan Mining Administration for the development of the coal resources near Tatung. That arrangement was made by the government of Shansi and is approved by the people of the province.

## CONSTRUCTION

The Canton Municipality proposes to rebuild the dangerously steep and narrow concrete bridges which exist occasionally on The Bund, and to fill up the filthy creeks.

**Engineering School.**—The members of the Mechanics Institute of Honam, Canton, are building a new home in which they intend to establish an industrial and engineering school. It is intended to put up a building which, when fully carried out, will cost \$120,000.

**New Trading Port.**—As Sun-tung of Nan-chong village is said to be the chief traffic centre of Hokshan and Sunwei districts, Kwangtung, and is also situated exactly between the borders of the two districts, the shareholders of the proposed Sunwei and Hokshan railroad company in Hongkong have recently proposed to open a trading port there. They have sent Chung Kai-kee there to supervise the construction.

**Magnificent Office Building for Manila.**—Eliseo Sendres, representing the Bank of Philippine Islands; H. B. Pond, representing the Pacific Commercial Company; Antonio Melian, representing the Hogar Filipino; and Gregorio Araneta and Senator Vicente Singson Encarnacion have agreed to build jointly an office building on the block bounded by Plaza Moraga, Plaza Cervantes, Calle Juan Luna, and Muelle de la Industria. This new building which will cost several million pesos, will be one of the best office buildings in the Orient. The offices will be "air cooled" and in other ways will represent the last word in present-day comforts and conveniences in such structures.

**Proposed Work on the Tientsin River.**—Engineers have made a survey along the shore at Taku for the purpose of conserving the Tientsin River. The result shows that if the sand beach is dredged, and the coast embanked ten vessels each having a draft of 20-ft. could pass into the harbor at the same time. This will save \$150,000 needed for the purpose of repairing the collapsed bank of Taku.

**The New Port for Tientsin.**—The "Peking Daily News" states that on account of certain opposition to the project to develop a new port for Tientsin as described in the January issue of THE FAR EASTERN REVIEW, the Ministry of Agriculture and Commerce is hesitating in the issue of a permit.

**Improving Wuchow.**—A movement is afoot to extend the northern boundary of Wuchow and build there a modern settlement. The cost is estimated at 3½ millions. It is estimated that about 2 million dollars will be required to construct the bund.

**Improving Canton.**—The Canton Municipality, finding that the Bund from the East Bridge to the Canton-Kowloon Railway Station is only forty feet wide, has decided to widen it to seventy. It has also been decided that from the Canton-Kowloon Railway Station to Tungchuen Maloo, it will be one hundred and fifty feet wide. This section of the road will be 1,455 feet long, according to a circulation agency news report.

**Y.W.C.A. Building for Canton.**—The Y.W.C.A. has purchased a piece of land of about 240 chengs in Tai Lee Hong inside Canton city, for the construction of a new building to cost more than \$20,000.

**Art Gallery for Osaka.**—Plans for erecting a large art gallery in Osaka at a cost of Y.1,000,000 are maturing. This project is endorsed by prominent citizens there who have already promised substantial donations either by cash or by art objects. The city office has set aside Y.8,900 with a view of making investigation before the plan is carried out. The city will soon ask bids from the local architects for plans of the new gallery.

**Mint for Shanghai.**—Reuter's Peking correspondent says it is understood that the Government has decided to establish the head mint of China in Chinese territory at Shanghai close to the International Settlement, under the direct control of the Currency Commission, which has appointed a committee of eight to purchase the ground and make the other necessary arrangements. The mint will be of enormous capacity and fitted with the latest appliances. Engravers and other foreign technical assistants will be engaged and the methods employed will be the most up-to-date. Banks sending silver to be minted will know the exact amount of coinage and the time when the coins may be received, the mint will merely charge seignorage and will not otherwise concern itself with the question of market values. It is estimated that the mint will turn out dollars in a year's time.

**Housing Difficulty in the Straits.**—Plans are under way in Kuala Lumpur, Straits Settlements, for the formation of the European Co-operative Building Society whose object will be to develop a section of Kuala Lumpur that shall be set apart as a residential reserve. At a public meeting last month a committee was appointed to draft a plan for organization, and to approach the Government for terms under which land would be leased.

## FINANCIAL

**Money for Chinese Government.**—A sum of \$800,000 forming a part of the Customs Surplus Fund for December was released by the Diplomatic Corps to the Chinese Government on January 6.

**Hongkong and Shanghai Bank Dividend.**—The Hongkong and Shanghai Banking Corporation will declare a Final Dividend for the year which will probably be £2.5 per share with a bonus in addition of £3.10.4, subject to deduction of income tax. There will be added to Silver Reserve, \$2,000,000, a sum of \$1,000,000 will be written off Bank Premises Account, and \$3,250,000 will be carried forward to next year. The annual general meeting of shareholders will be held on Saturday, February 28.



**Asia Bank and the Italian Loan.**—Subscriptions to the sixth Consolidated Italian Government five per cent. loan are now being received at the Asia Banking Corporation. Bonds are in denominations of Lire 100 and the issuing price is Lire 87.50 plus interest from January 1 to the date of payment.

A bond of Lire 100 may be purchased for about Mex. \$6.75. One hundred Shanghai taels will purchase about Lire 2,000 in bonds at the present exchange. At par the lira is equal in value to a franc and is worth about 10d. in English or 20 cents in American currency. Thus in normal times the Lire 2,000 equals G.\$500 or £80. Arrangements have been made by the Asia Banking Corporation to allow subscribers 10 months in which to make payments.

**Is China Poor?**—The Government proposes to make a donation of \$100,000 in Government banknotes (which in reality is about \$50,000), to the relatives of the late acting-President Feng Kuo-chang, to defray his funeral expenses. General Feng died quite recently and is reported to have left an estate valued at \$23,000,000!

**Customs Receipts at Tientsin.**—The receipts of the Tientsin Chinese (Native) Customs for 1919 are reported to amount to Tls. 5,000,000, a figure considered highly satisfactory by the officials.

**New Sino-Japanese Bank.**—The scheme of establishing an American-Japanese bank promoted by President Inouye of the Bank of Japan and Baron Shibusawa will be brought into tangible shape shortly.

**Philippine Chinese Organize Big Bank.**—Three million gold dollars towards the formation of a new Chinese bank was subscribed by Chinese in Manila in less than two hours and it is now intended to capitalise the new institution at P.20,000,000, with the expectation that the remaining 14,000,000 will be raised without difficulty. The money was pledged at a meeting of the Manila Chinese Chamber of Commerce. Uy Yet-chu, sugar producer of Java, subscribed P.1,000,000. The remainder was promised by 20 others. It is proposed to incorporate the bank under the laws of the Philippines to be operated entirely by Chinese for the benefit, for the most part, of Chinese. Its business will probably not be confined to the Philippines but will branch out to various places in the East. It is believed that the entire capital will be subscribed at the next meeting of the Manila Chinese Chamber of Commerce.

**Sinkiang and Loan.**—The Peking Government has received a telegram from General Yang Tseng-hsin strongly urging it to refrain from negotiating foreign loans which, he holds, have been calamitous in the past. He has used his influence to oppose such loans wherever possible, notably when President Yuan Shih-kai cancelled the proposal of a \$5,000,000 loan from Russia on the security of Sinkiang mines, and also when a loan of \$1,000,000 on the security of the cattle tax was proposed for developing industry. General Yang Tseng-hsin disclaims all connection with the report that an attempt was made by a Government official to borrow money from Japan to be secured by all the mines in his province.

**More Talk of Reform.**—Under the auspices of the Chinese Ministry of Finance, a financial conference will shortly be held in Peking with a view to introducing reforms into the present financial administration in the country. The Chiefs of the Financial Bureaux in the provinces have been requested to despatch delegates to Peking to participate in the conference.

**Exchange Fluctuations in 1919.**—Mr. H. F. Bell, in his annual report on exchange writes:—

The Exchange market during the year 1919 has been of so fluctuating a nature that a comprehensive report would seem to be rather a hopeless business.

All who were in Shanghai will know of the big cash premiums that were "going" from time to time and exporters will know, too, to their cost, of the high rates that they had to face with their bills.

As all my records of Exchange have been of the "official" quotations, the same have been adhered to, though I am fully conscious that these official rates do not convey the true state of our market.

**Silver.**—The lowest quotation was 47½ which remained unchanged at this price from February 24 to March 26. On May 9-10 information arrived that the Government restriction on silver had been removed, when a marked advance in the price of the metal took place, and though with some ups and downs this advance continued right on to the end of the year, the highest point touched being 79½ as reported on December 17, so that the rise from first to last, was from 47½ to 79½—31½.

**T.T.**—Dealing only with the "official" rates, the lowest was on March 8 and 10 4/6 and the highest 7/10 from December 15 to 30 (but during that fortnight probably 1/- over this rate was done).

Though exchange was so high at the end of the year, the average for the whole year works out at only 5/7½.

The last five years' averages are:—

1915 2/3½  
1916 2/11½  
1917 3/10½  
1918 4/8½  
1919 5/7½

Average rate for 5 years 3/10½.

Average rate for last 10 years 3/2½.

#### SUMMARY OF EXCHANGE HIGHEST AND LOWEST With Average Monthly Rates 1919.

Month	Date	Bar Silver	Highest		
			T.T.	4 M/s.	Credits
Jan.	All Jan.	48½	5/1	5/3½	
Feb.	7	48½	5/-	5/2½	
Mar.	31	49½	4/8½	4/10½	
April	1.2-30	49½	5/-	5/2	
May	13	58	5/3	5/5	
June	18-19	54½	5/4½	5/6½	
July	31-½	55½	5/6	5/8½	
Aug.	28-9	61½	5/11½	6/2	
Sept.	25-7	63½	6/3	6/6	
Oct.	30-31	66½	6/8	6/11½	
Nov.	26	76	7/4	7/8½	
Dec.	17-½	79½	7/10	8/2½	Highest

Date	Bar Silver	T.T.	Lowest		
			4 M/s.	Average Monthly Rate	
All Jan.	48½	5/-	5/2½	5/-½	Average rate 6 mos. = 4/11½
27	47½	4/7½	4/10	4/9½	
8-11	47½	4/6	4/8	4/7½	
28-7	48½	4/8½	4/10½	4/9½	
8-2	48½	4/11½	5/1½	5/1½	
3	53½	5/2½	5/4½	5/3½	
3-4	53	5/3	5/5½	5/4½	
1	55½	5/6	5/8½	5/9½	
1	58	5/10	6/-½	6/-½	
11-14	62½	6/3	6/6½	6/4½	
1	65½	6/6	6/9½	6/11½	Average rate 6 mos. = 6/-½
1½	72½	7/4	7/8½	7/7½	

**The £5,000,000 Loan.**—It is reported that negotiations are still proceeding between the old Consortium bankers and the Chinese Government for a loan of £5,000,000. The Chinese Government is hopeful of getting the money before the end of February.

**Bank Note Values.**—It is interesting to note that Bank of China notes are worth \$1.16 in silver for every dollar in paper in Canton, while in Peking they are at a heavy discount.

**Hoarding Silver in China.**—Mr. Chang Kung-chuan, Vice-Governor of the Bank of China, says: "According to reports to hand, the export trade of China has been decreased by \$100,000,000 annually while \$300,000,000 worth of silver has been stored up by the people within the last three years. For the last six or seven years, all the mints in China have produced about \$600,000,000 worth of silver coins.

The habit of hoarding silver must be done away with if the native trade is to be improved. The redemption of the banknotes also depends largely upon the abolition of the silver-hoarding habit of the Chinese people.

#### MISCELLANEOUS

**Jehol Development.**—A number of Tientsin merchants have petitioned the Minister of Commerce and Agriculture at Peking for permission to organize a company to develop the resources of Jehol, such as mining, afforestation, etc.

**Japan and the Shantung Rights.**—Mr. Obata, the Japanese Minister at Peking, recently notified the Chinese Government that the Peace Treaty having come into effect, Japan succeeds to the rights enjoyed by the Germans at Kiaochow, in accordance with the terms of the Peace Treaty. He informed the Government that the Japanese Government were ready to begin negotiations for the restoration of the former leased territory, if the Chinese Government were also willing. He also said that Japan would immediately withdraw the railway grants, therefore it was to China's interest to negotiate as soon as possible. The Chinese Government had made no reply when this issue went to press.

**Company Promotion in Japan.**—Mr. Hara, the Premier of Japan, in a new year statement, deplored the growth of luxurious tendencies among certain classes of Japanese. He did not regard the promotion of large numbers of joint-stock concerns as a healthy economic sign and, he said, "judging from what occurred after the conclusion of the Russo-Japanese war, it is not at all improbable that the crash may come at any moment." He urges the Japanese to refrain from indulgence in luxurious habits.

**Pumps for Tientsin.**—The Tientsin Municipal Council are inviting tenders for a pumping plant capable of discharging 66,000 gallons per minute against a total head of 13 feet.

**Manchurian Development.**—It is reported that the Manchurian Development Company, which was established by General Chang Tso-lin, Tuchen of Fengtien, and Japanese capitalists will have power to open mines and to issue bank-notes.

**Rubber in Borneo.**—There are at present upwards of 40,500 acres under rubber cultivation in the different Residencies of the state of North Borneo, of which more than 23,300 are in full tapping.

**Agricultural Development in the P. I.**—The National Development company, the 50 million peso Philippine Government corporation, has purchased a big tract of land near Cabanatuan, Nueva Ecija, for a rice and corn plantation. The land has an area of over 11,400 hectares and cost the government about P.290,000.



**Manila Budget for 1920.**—The municipal council of Manila has approved the city budget for 1920. It carries about P.6,500,000, or nearly P.1,000,000 more than last year's.

**Dye Imports.**—Aniline dyes to the value of £50,000 were imported into Hongkong from the United States and Japan during the first six months of this year, and requirements are increasing.

**A Progressive Chinese Official.**—The Tuchun of Shansi province, who has carried on a very progressive policy, has certainly inspired others to follow suit, the latest being General Chen Chiung-ming, of Southern Fukien. He has established Municipal Councils in all cities under his jurisdiction, and has encouraged local self-government and modern methods for the development of the cities. Soldiers have been employed on various public works and over two hundred li of roadway has so far been built.

**Chinese Oppose Stamp Tax.**—Several telegrams have reached the Central Government at Peking from the Chinese Chamber of Commerce opposing the suggested introduction into the Shanghai settlements of revenue stamps. It is understood that the Government is making arrangement for the enforcement of revenue stamps in Shanghai. The merchants have informed the Government that in recent years the public have been taxed to the utmost extent, and refuse any new tax.\*

**Hongkong's Economic Resources.**—The Governor of Hongkong has appointed a Committee to enquire and report on the question of the development of the economic resources of the Colony of Hongkong. The following have been appointed members of the Committee:—The Hon. Sir C. P. Chater, Kt., C.M.G., Chairman; the Hon. Mr. E. V. D. Parr, Deputy-Chairman; the Hon. Mr. Lau Chu-pak, the Hon. Mr. John Johnstone, Mr. J. Barr, Mr. A. Beattie, Mr. Chan Harr, Mr. Chow Shou-son, Mr. R. M. Dyer, Mr. A. Gibson, Mr. D. K. Moss, Mr. J. Reid, Mr. Ross Thompson, and Mr. W. J. Tutcher.

**Japanese Sugar Venture in Java.**—Japanese sugar venture on a large scale is reported from Java, where a group of enterprising Japanese business men have succeeded in buying up for Y.3,500,000 a complete sugar estate, including factories, etc., formerly run by the German interests. The present scheme is based on this purchase, and the capital is estimated at about Y.10,000,000. The shares issued have practically all been taken up by the promoters, among whom the names of Messrs. Yamamoto Teijiro and Mogi Sohei are conspicuous. The development of the project is followed with a great deal of attention.

**Agricultural Progress in South China.**—News from Nanning, Kwangsi Province, states that remarkable progress is being made in the planting of wood-oil, cotton, and camphor trees, by the Agricultural Experiment Station which is located near Tai Mok mountain, outside the northern gate of Nanning city.

**To Investigate Industries.**—Mr. Yih Kung-cho, former Vice-Minister of Communications, who has recently been on a trip to Europe, has been appointed by the Peking Government to investigate industrial possibilities in the various provinces. Mr. Yih has submitted a memorandum to the Kuowuyuan, setting forth a number of recommendations in connection with his mission and asking the Government to grant him a monthly allowance of \$7,000 for the travelling expenses of his party while on the mission to the provinces. His recommendations regarding the encouragement of industrial development will be brought up for consideration at a Cabinet meeting.

**Police Adviser.**—It is reported from Peking that the Ministry of the Interior has decided to renew the engagement of General Bruce as Adviser on police matters for another year. The salary is stated to be \$1,800.

**Disbandment of Troops.**—Since the issue of the Cabinet order for the reduction of 20 per cent. of the military expenses all over China, several provinces have commenced the work of reducing their standing army. The Ministry of War and the Board of the General Staff have received reports from various Tuchuns on the progress of the disbandment of superfluous troops. In Chihli, Fengtien, Kiangsu and Anhui, a reduction of 10 per cent. has already been effected throughout all districts. In Hupeh, Kiangsi, Chekiang, and Shantung a reduction of 10 per cent. will be completed during January. In Heilungkiang, Sinkiang, Shensi and Kansu, a reduction of 10 per cent. will be effected within a period of two months on account of the frontier and other difficulties. However, as the troops in South Kiangsi, South Hunan and South Shensi are doing important defence work, they cannot be reduced while the plan of disbandment has not yet been adopted by the South. The Tuchuns of these provinces have requested the Government to postpone the operation of the plan for three months, during which negotiations will be carried on with Southern leaders.

**America Withdraws Troops from Siberia.**—The Government of the United States issued a statement on January 13 announcing the impracticability of continuing to act on the offensive in co-operation with anti-Bolshevik forces in Siberia. In view of this fact arrangements for the concentration of American Troops at Vladivostok for return to America are being made. Their embarkation is expected about February 10. The statement adds: "Careful consideration has also been given to the possibility of continuing after the departure of the American troops the assistance of American railway experts in the operation of the Trans-Siberian and Chinese Eastern railways. It will be recalled that it is expressly stipulated in the plan for the supervision of these railways which was submitted by the Japanese Ambassador at Washington, January 15, 1919, that the (? arrangements) should cease upon the withdrawal of the foreign military forces from Siberia and that all foreign railway experts appointed under the arrangements should then be recalled forthwith. The experience of recent months in the operation of the railways under conditions of unstable civil authority and frequent local military interference furnishes a strong reason for abiding by the terms of the original agreement. Plans will be made accordingly for the withdrawal of the American railway experts under the same conditions and simultaneously with the departure of the American military forces."

## PERSONAL

Mr. Allen Clifford Arthur Henning has been admitted as a partner in the firm of William Forbes & Co., Peking.

Mr. G. N. Manley of Messrs. Brunner, Mond & Company has been transferred from Hongkong to Nanking.

John R. Wilson, local manager of the Overseas Trading Company, has been appointed Philippine agent of the Los Angeles-Pacific Navigation Company, which is proposing to establish a direct freight and passenger line between Manila and San Pedro.

Mr. A. G. Stephen, manager of the Hongkong & Shanghai Banking Corporation, has received the distinction of the Chiaocho (Excellent Crop) Second Class, from the Peking Government.

E. F. Webster, the new vice-president of the Pacific Commercial Company, has arrived from the United States to take up his duties in Manila. Mr. Webster succeeds H. B. Pond, who is now general manager of the company.

Mr. John Prentice on January 3 completed his fifty years' residence in Shanghai. Mr. Prentice came out to join the technical staff of Messrs. Muirhead & Co. in January, 1870, and became one of the pioneers of British shipbuilding and engineering in China. During his half century here he has been identified with all movements affecting the welfare of the settlement.

Mr. J. B. Sutor, Commercial Commissioner in the East for the Government of New South Wales and who is stationed in Kobe, Japan, left there on December 27 on an inspection trip of the Philippines, China, the Straits Settlements and other places in the Far East.

Mr. C. Biren, for the last five years chief clerk of the Peninsular and Oriental S.N. Co., in Kobe, Japan, has recently been transferred to Shanghai.

Mr. Norman F. Blanch, general superintendent of Thos. Cook & Son for the Far East with his chief offices in Shanghai, has just returned from a four years stay in England.

Mr. G. H. Stitt, agent for the Hongkong and Shanghai Banking Corporation in Kobe, will leave there in the early part of February, 1920 to take charge of the Shanghai office of the bank during the absence of Mr. Stephen. Mr. Stitt will be temporarily succeeded by Mr. MacArthur of the Shanghai office, the latter having previously been in the Kobe office.

Mr. J. J. Steep, Managing Director for the International Trade Developer for the Orient, Australia and Africa, who has been attending the opening of a new branch office in Kobe, is visiting China. Mr. Steep will continue his trip to Australia thence for Africa in the interests of his firm whose headquarters is in Chicago.

It is stated that the President of China has recently ordered a sum of ten thousand dollars to be issued to Sir Richard Dane, former Co-Director of the Salt Administration, in appreciation of valuable services rendered by the latter.

Mr. Lu Tseng-hsiang, and Mr. C. T. Wang, two of China's delegates at the Paris Peace Conference returned to China towards the end of January.

Mr. J. O. P. Bland, the famous writer on Chinese subjects, is at present revisiting China.

Mr. W. G. Avery, General Manager of the Asia Banking Corporation, visited Manila, Hongkong and Canton during January. During his absence from Shanghai, his duties were assumed by Mr. J. H. Wickers, Assistant General Manager.

## CORRECTION

On page 742, December issue, the name Myithyina should be Katha; and on the same page the word eastern should be western in the paragraph mentioning jade and marble.